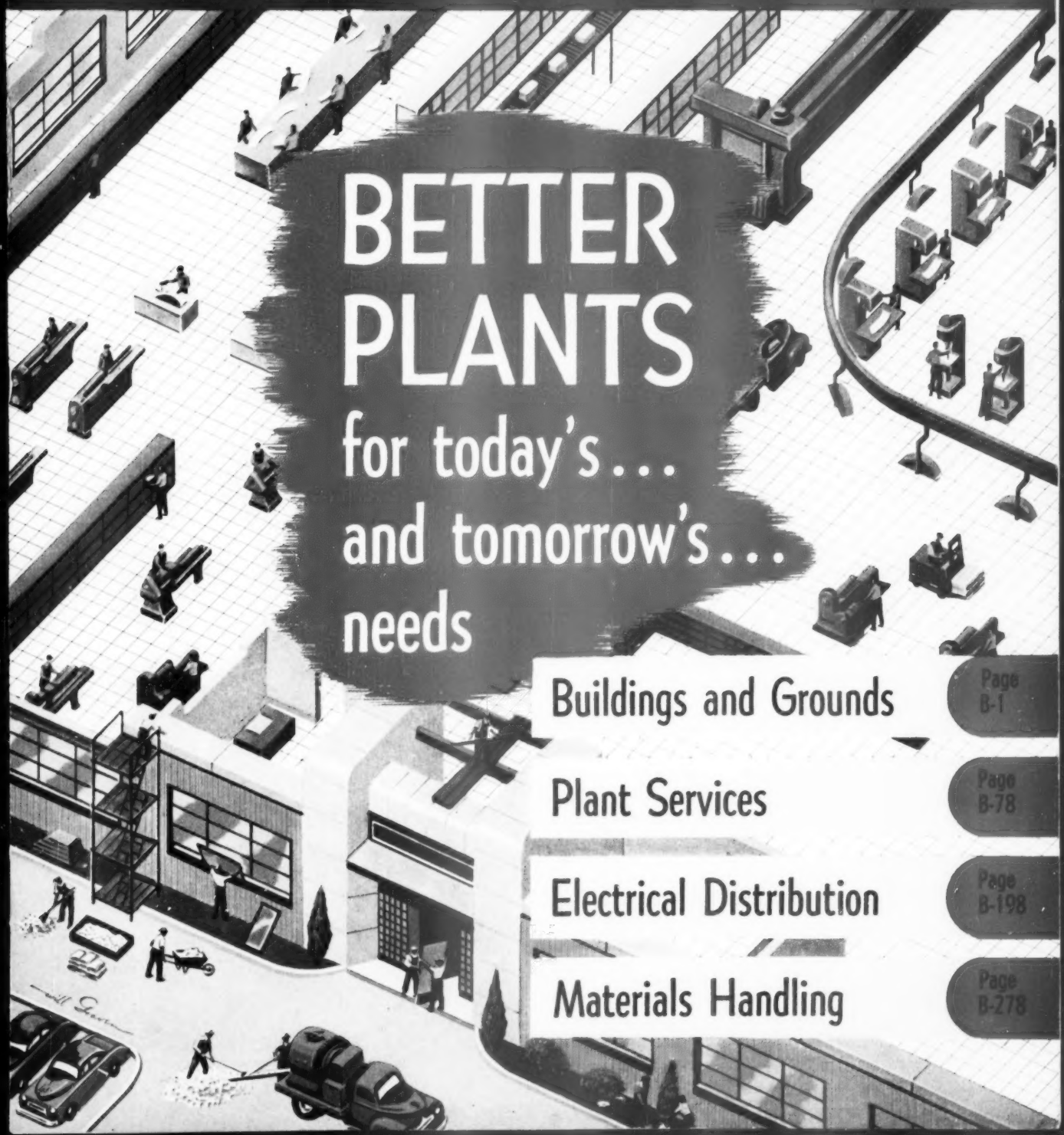
19th ANNUAL PLANT BUILDINGS ISSUE

FACTORY

MANAGEMENT AND MAINTENANCE

MAY 1953
IN TWO PARTS
PART TWO



BETTER PLANTS for today's... and tomorrow's... needs

Buildings and Grounds — Page B-1
Plant Services — Page B-78
Electrical Distribution — Page B-198
Materials Handling — Page B-278

The NATIONWIDE TREND is toward

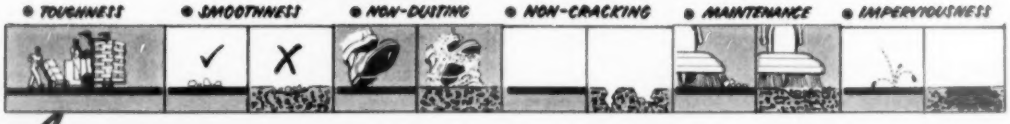
Kalman CONCRETE FLOORS

★ Offices:

Kalman has the METHOD and the "KNOW-HOW"

Nationwide service • One responsibility • 37 years experience with America's top industrial firms • Over 270,000,000 sq. ft. now in service • All installations done by skilled Kalman crews.

Only Kalman offers all these advantages:



Kalman FLOOR COMPANY, Inc.

110 EAST 42ND STREET
NEW YORK 17, NEW YORK

District Offices: Boston • Charlotte • Chicago • Cleveland • Dayton • Detroit • Houston • Los Angeles • Philadelphia • San Francisco

FACTORY MANAGEMENT AND MAINTENANCE

HARRY LEE WADDELL, EDITOR

BETTER PLANTS for today's... and tomorrow's... needs

Are We at a Turning Point in Construction of New Plants?

Seems to us that we are—that manufacturing industry is shifting its emphasis now from its headlong rush toward additional capacity to a realization of the importance of more efficient capacity.

The figures on page 56 of Part One of this issue (bound separately) indicate this. But the point has been brought home to us even more forcefully by our conversations with industrial people who contributed to our background for this BETTER PLANTS issue.

Certainly industry expects to increase its capacity as a result of the huge capital expenditures it is making—and plans to make in the future. But we get the "feel" that it is making these expenditures with a keen awareness that the new plants will allow the retirement of older, higher-production-cost capacity.

That's why we think this BETTER PLANTS issue—the 19th in FACTORY's annual series of Plant Buildings Issues—has a particularly important job this year.

Its purpose is to bring together in one place the Big Ideas in plant design and service facilities that are making so many old plants obsolescent. For it is the plant-operating group of executives who have the primary responsibility of alerting the entire management of any company to the cost-saving opportunities of a new plant. We hope this issue will help them with that job—and help them explain the advantages in actual dollars-and-cents terms that their financial management people can readily understand.

What Is an Obsolescent Plant?

In our research for this issue, a top-flight plant engineer for a leading company had something to say on this question. It went about like this:

"It isn't so much that the plant as a 'shell' becomes obsolete—although it does in some cases, of course. It's more that . . .

"**Locations become obsolescent**—and new plants are needed because of shifts in sources of material and labor supply and markets;

"**Products become obsolescent**—and new plants to make new products are needed because of changes in consumer desires, and inroads of products that were once not considered competitive;

"**Processes become obsolescent**—as new, far better ways to produce are developed;

"**Most important, people become obsolescent**—in their thinking about what *can* be done, and what *should* be done to keep established industries from withering."

Where Do These Ideas Come From?

The information assembled in the four sections of this issue represents more than three months' intensive research by FACTORY's editors.

Their research wasn't in books, but with people. They have talked with hundreds of men—in manufacturing industry, and in the engineering-design-construction field—who have been *setting the trends* in new plants by building them. And they've visited scores of plants.

We wish we had space to list all those who were so generous with their time and so willing to share their experience and ideas. But they themselves precluded this, by loading us with so much information. We think they'll agree that it is good judgment to use every inch of available space for that information. And we are sure our readers will join with us in a sincere—even if anonymous—thank-you.

Harry Lee Waddell

BETTER PLANTS for today's... and tomorrow's... needs

A report on Trends in . . .

Buildings

By ROBERT A. DILLEY • Midwestern Editor, FACTORY

1. BETTER PLANT LOCATION

Rush to the country is still on. FACTORY editors find water supply an increasingly critical factor. Natural gas opens new areas. Ideal sites have access to more than one highway. Nuisance-creating plants to get colder shoulder. *Page B-4.*

2. EXPANDABILITY

Plenty of land is high up on the must list for almost all new plants. Sites of 300 to 400 acres not uncommon—even for smaller plants. Many plan 50% to 500% expansion on present sites, have at least one temporary wall. *Page B-5.*

3. FLEXIBILITY

Bays are bigger than ever—to permit column-free floor space. Ceiling heights? Going up—to accommodate taller production machines and service equipment, also overhead handling and unit-load tiering. Floors stronger—and harder. *Page B-6.*

4. LOW COST

Researchers and contractors are developing better and cheaper construction techniques. New easy-to-erect materials are replacing masonry for upper sidewalls in many of the newer plants. Lightweight materials get the call. *Page B-7.*

5. LOW-COST MAINTENANCE

FACTORY editors find most new-plant owners are willing to pay more for building materials that need little maintenance. Like 20-year roofs. Stainless steel or aluminum roof decks. Glazed tile walls and partitions. Surface-hardened concrete floors. *Page B-8.*

and Grounds

6. BETTER-LOOKING PLANTS AND GROUNDS

Today's new plants are designed with an eye to community relations. They're trimmer, cleaner-looking. Industry is using newer, lighter-colored brick, more aluminum and stainless steel doors, even picture windows. FACTORY editors report better landscaping, more extensive recreational facilities. *Page B-10.*

7. BETTER IN-PLANT ENVIRONMENT

Industry is learning that people who live in more comfortable houses like to work in pleasant plants. So the new plants for 1952-53 stress attractive and convenient workplaces. *Page B-11.*

8. FAST CONSTRUCTION

Big plants are being built and turned over to their owners in a few months' time. FACTORY editors found the secret lies in better planning, better owner-architect-builder liaison. Smart companies let one key man call the shots. *Page B-11.*

9. MORE OFFICE AND ENGINEERING SPACE

There's more white-collar room in today's new plants. Facilities are more efficient, not necessarily "plushy." There's less crowding—and more space devoted to cafeterias, restrooms, laboratories, drafting rooms, etc. *Page B-13.*

10. BIGGER AND BETTER PARKING AREA

FACTORY editors found plenty of parking space at most of the new plants of 1952-53. For both employees and visitors. Most of it well marked. But few plants have planned enough entrances and exits to get cars in and out fast. *Page B-13.*

PLANT-BUILDING TRENDS are slow to develop, hard to identify. Fads are plentiful. But there are significant tendencies evident in most new plants that we believe are firmly enough rooted to be called trends.

The most important overall trend is the increasing influence of plant-operating management — production, maintenance, and industrial relations — in new-plant planning.

The growing complexity of modern, more-mechanized industry is making this necessary. The plant's location, its dimensions, its layout, its services—all these team up with production processes and equipment and manpower to make an integrated manufacturing unit.

This "teamwork" between the building itself and the processes in it is one of the big reasons why a new plant can cut operating costs.

TURN THE PAGE for more on trends ▶

SIGNIFICANT PLANTS of 1952-53

Stratos Division ... page B-14 ▶

White Horse Mill ... page B-16 ▶

The Black & Decker Manufacturing Company ... page B-20 ▶

QUICK IDEAS for better buildings and grounds ... page B-22 ▶

NEW CATALOGS ... page B-40 ▶

Begins on page B-2

10 Trends in...
Buildings and Grounds

A SELF-SUFFICIENT VILLAGE, including 200 homes, school, and shopping center, was built for employees by Greenwood Mills Corporation. Brick houses range in size from 4 to 7 rooms, have modern kitchens and baths. Rental is moderate.

1. Better Plant Location

Without a doubt, industry is paying more attention than ever before to the problem of plant location. And with rough-and-tumble competition ahead, the right location may mean the difference between profit and loss.

One other thing is sure: Companies that once thought they had a "master formula" are being forced to start from scratch.

Moreover, as companies begin to dig into the problems of plant location, they find few people who can tell them exactly what to look for—or what to do with it when they find it.

That's because plant location is probably the most "personal" factor relating to new plant planning. One location might bring success to one company, disaster to another. And one astute observer told us he'd rather have a poor plant in a good location than a good plant in a poor location.

CITY EXODUS • The mad rush to the country is still a rush, but not quite so mad. Some companies—General Motors, for one—have discovered that rural tax rates soon catch up with city rates. And the utilities frequently can't take on new loads.

Then, too, GM learned that the city fathers often have more on the ball than their country cousins. It's easier to cooperate on site selection and development with public administrators who can function with understanding and ability.

The result—for GM—has been a compromise. Many of its plants are now being erected on the fringes of populous communities, just *inside* city limits.

Still other companies that moved to the country have discovered that skilled labor wouldn't follow. At least not without financial persuasion. They have learned that you can draw labor from a radius of about 30 miles if roads are good and lightly traveled. If employees must travel through congested areas, however, that distance must be scaled down to 15 or 20 miles.

But FACTORY editors found most of our newly countrified industries happy about the whole thing. Housing for employees has been a problem in more than one case. At least one company, Greenwood Mills Corp., Greenwood, S. C., solved it nicely by building houses and renting them to employees at ultra-reasonable rates.

Site-Selection Factors

WATER • Gone are the days when industry could break earth along any river or stream for its new plants. Sites offering pure water in reliable quantity are at a premium. Industry finds itself pinched by population and industrial growth as well as by its own misbehavior.

So FACTORY editors found smart companies giving plenty of attention to water supply. Supply and quality analysis, water table mapping, munici-

pal source guarantees, pretreatment, post-treatment—all are important when picking new sites.

If anything, the water problem is causing some companies to stick close to municipalities with good systems and plentiful supply.

FUEL • Time was when big fuel users in the Midwest and East were forced to use coal or oil. Gas was too expensive. Today, with natural gas moving into new areas—as far from the source as New England—fuel requirements demand another look. Many companies have already built plants along or near these new pipelines.

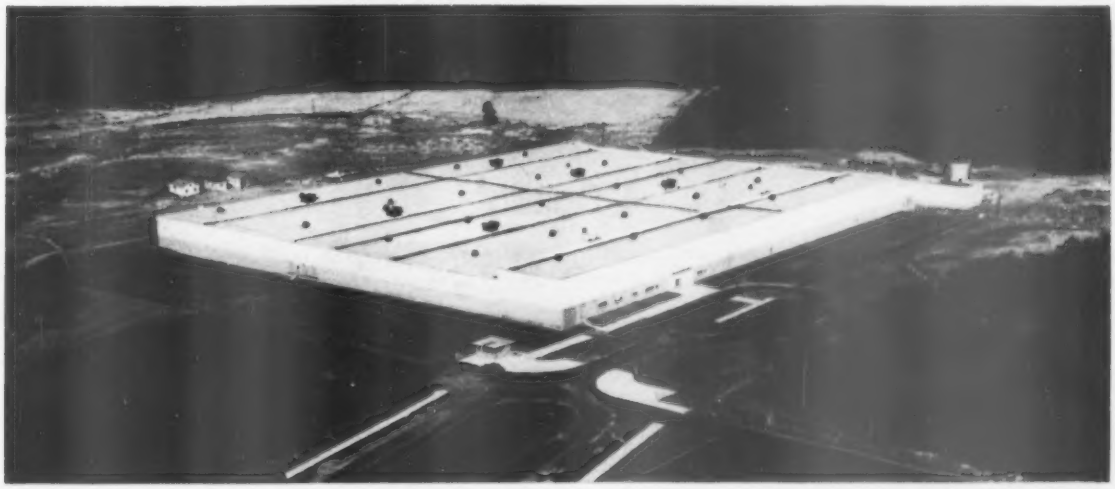
A case in point is Delco Products' new plant near Dayton. Its site adjoins a main railway line with a natural gas pipeline on one site, and oil pipeline on the other.

Delco takes gas from the line right at its own property. Oil is taken off at Dayton and returned the short distance to the plant.

Better preparation and better equipment for handling and firing coal are making it more attractive as a fuel.

TRUCK TRANSPORT • A great many plants now receive and ship by truck exclusively. Still others want dual service—truck and rail. FACTORY editors found increasing attention being given to location near good highways. And the area with cheapest freight rates now frequently gets the nod.

Fewer companies are picking locations near *one* good highway. The ideal site now seems to be one with potential access to several nearby arterial routes and highways.



ALL OF MAINE—OR SO IT SEEMS—IS AVAILABLE FOR EXPANSION ON TWO SIDES OF THE SACO-LOWELL SHOPS.

2. Expandability

Rapid progress of the last decade has taught alert managements one big lesson. Plant expandability is essential. Practically all of the better plants are being designed with that in mind.

Many companies are planning for expansion of anywhere from 50% to 500% on the present sites.

FACTORY editors saw one excellent example of how even generous allowances for growth and process changes were too pessimistic.

A splendid new plant, occupied in 1952, is already too small. Its engineers told us that instead of allowing a 10% factor for immediate growth, they should have allowed at least 50%! Fortunately, their plant was designed for quick and easy expansion, so their troubles will be temporary.

SITES • Foremost need for future expansion is, of course, land. Land with available water, fuel supply, and power supply.

Inflated urban land values have helped to send many a company to the country. But by the same token that company has been able to buy large areas of good land at low cost. Typical of such sites is that picked by Saco-Lowell Shops for its new Edwards plant at Biddeford. The photograph shows how the site was carved out of the Maine woods, with plenty of room left for expansion.

At Louisville, General Electric is developing its Appliance Park on a 1000-acre tract. About 100 acres will be under roof, and 400 acres will be in active use.

Another big corporation won't look at a site of less than 100 acres. In fact, FACTORY editors found that many medium-size and small plants are being erected on sites of 300 to 400 acres.

Parking lots, incidentally, can get in the way. One plant owner ruefully admits he'll have to sacrifice an excellent parking lot in order to expand.

Turn the page

And expansion is imminent for him. His failure to plan will cost him several thousand dollars.

BUILDINGS • Most companies today are designing expandability into their plant structures.

They find it's cheapest, and often best, to make all plans for expansion on paper, then to spend the extra dollars needed to protect themselves in case of future growth. A temporary wall, larger service distribution lines, prepunched steel beams, proper location of services—these are some of the things companies are spending money for now, because they know they'll get it back fast when they start to expand.

FACTORY found plenty of evidence of this kind of planning. The new Frigidaire plant in Dayton (page B-290) is a fine example. Underground service lines were laid to coincide with future service tunnels that will be part of any extension. The outside sprinkler loop is destined to become part of the inside loop. In fact, all important features of the plant were preplanned for expansion.

A textile mill in the Southeast has even gone so far as to pour the foundation for an expansion at the same time it poured the foundation for the original plant.

Delco Products, at its new Dayton plant, built a bridge between its first manufacturing unit and the power house. Purpose of the bridge is to support service lines until a second manufacturing unit is built in the intervening space. Trusses for the new unit will be erected around the piping —which won't have to disturbed.

TEMPORARY WALLS • It's getting hard to find a new plant without at least one temporary wall. Popular walls for this purpose are the sandwich-type. They come in standard sizes. They are portable. And can become permanent in their new location.

FACTORY editors found one that had been moved three times. Each time it was unbolted and rebolted in a new location.

Cinder block or concrete block is also used for temporary walls. These walls don't cost much and can be demolished quickly and easily for expansion. Rand-McNally's new Skokie (Ill.) plant is prepared for expansion in this way.

3. Flexibility

Having enough floor space for future needs is one thing. Having the right kind of floor space is another. That calls for true flexibility. And the bigger bays, higher roofs, and stronger floors that FACTORY editors found in the better plants of 1952-53 are providing it.

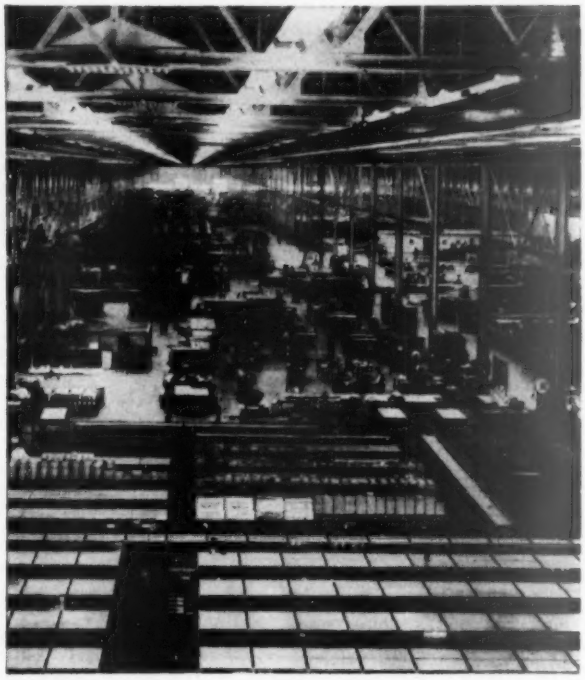
BIGGER BAYS • Today, 40 x 60-ft. bays are close to average. But all signs point to even larger bays.

Take The Singer Manufacturing Company: Prior to 1940 it operated a plant with 20 x 30-ft. bays, —one column for every 700 square feet of floor space. In 1940 Singer opened a plant with 40 x 60-ft. bays, or one column to every 2700 square feet.

In Singer's new Elizabethport (N.J.) plant, bay sizes are 40 x 60 feet and 40 x 80 feet. This figures out at one column for every 4300 square feet.

Just how far this trend to bigger bay sizes will go, is anybody's guess. But structural designers seem to find ways to "stretch" bays to suit industry's needs. Clear spans of 100 feet are not at all uncommon these days. Piasecki Helicopter Corporation's new Morton (Pa.) plant addition has 100 x 120-ft. spans. Only six interior columns were used in the 360 x 400-ft. factory area—one for every 24,000 square feet.

HIGHER ROOFS • Ceiling heights are going up. Custom formerly dictated a clear space from the floor to the lower truss chords or to the bottom of the beams of 13 to 15 feet. But now 18 feet is about average. And some building designers think 18 feet is still too low for conveyorized manufacturing. In high bay areas, 40 feet is considered excellent.



HIGH BAY—40 feet—provides great flexibility in final assembly area of Ford's Kansas City aircraft plant.

Many factors are forcing the use of more clear space. Unit load tiering has grown in use. Insurance restrictions on clearance of sprinkler lines are forcing ceilings up.

Production machines are getting taller. As

production processes are combined, the new integrated machines that result are getting bulkier.

Plant service equipment is getting larger. Moreover, the tendency is to get it up close to the ceiling and out of the way of production equipment.

STRONGER FLOORS • The minimum plant floor today consists of 5 or 6 inches of concrete. FACTORY editors found many 8- and 10-in. reinforced floors — some even double-reinforced — when they inspected the new plants of 1952-53.

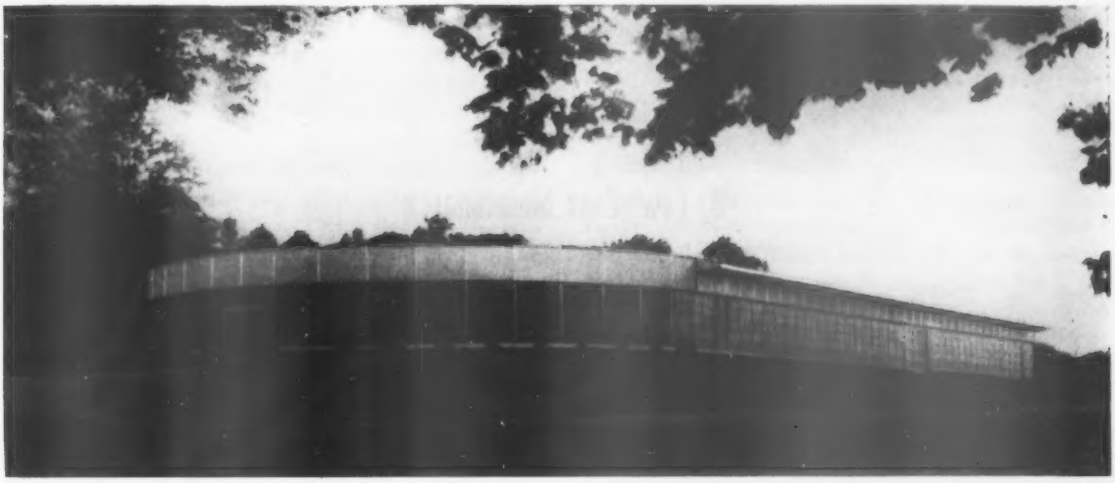
The net result is greater over-all strength. Today's average floors are capable of holding from 600 to 2000 pounds per square foot.

Two other strong trends are notable. Contractors are taking a page from the highway builder's book and using heavy compaction equipment to increase the bearing power of the soil. Compaction insures a strong floor with a minimum of concrete. In some of the bigger plants, regular highway paving machines have been used to lay floors.

Surface hardening is growing in use, too. To avoid dusting and high maintenance costs, many companies are paying a higher first cost for a hardened floor. Liquid and metallic hardeners are commonly used.

And the Kalman-type heavy-duty floor finish is growing in popularity. (Write Portland Cement Association, 33 West Grand Ave., Chicago 10, for specifications.)

Another trend is to make floors uniformly strong throughout the plant—for complete flexibility, of course. The older practice was to vary the thickness of the floor according to the needs.



HANDSOME AND FUNCTIONAL, and yet it cost only $6 a square foot. Filler Machine Company's new plant uses glare-reducing glass around all four walls. Plant is depressed two feet so employees look out onto terraced lawns.

4. Low Cost

The trend is strongly in the direction of low first cost. To get it, plant owners have frequently sacrificed architectural attractiveness, functional utility, and low maintenance cost.

Materials suppliers are developing new and better materials. At the same time, researchers and contractors are developing better and cheaper construction techniques. Here are seven things that companies are doing to keep building costs reasonably low:

1. **New-plant committee develops plans.** It includes men with the functions of production manager, plant engineer, industrial relations manager, and accountant. The chairman has authority to take action and make decisions. Architects and builders tell us that many companies waste time and money by not doing this.

2. **Alternate proposals are studied** on material and erection costs. Materials and labor costs vary significantly in different sections of the country. Architect submits estimates on two or three possible types of construction before selection is made.

3. **Modular design is used throughout** the structure. The 8-ft. module is popular now, but chances are that it will increase. Structural steel, wall panels, sash, and roof deck, for example, are all available in modular sizes now.

4. **Plans are developed fully,** including the architecture and engineering, then bids are invited. They get architect's advice on the bids before signing a contract, and have him supervise construction.

5. **Contractor helps develop the schedule,** based on mill schedules for steel. Since the contractor works to a close schedule with men and equipment, he is given leeway to schedule the job.

6. **Changes are omitted** after the contract is let.

Turn the page

Contractors have told us that changes during construction have frequently added as much as 10% to the cost of a plant. And changes inevitably result in a slowdown.

7. Trimmings are skipped. They add to the cost of the plant. However, trimmings on a plant have considerable value from the standpoint of employee and community relations.

Other Ways to Low Cost

• **Rigid frames** distribute load through smaller structural members welded or bolted together. Atlanta Envelope Company's new plant in Atlanta has exterior columns acting as rigid knees to carry much of the load into the floor slab.

• **Cantilevered-frame construction** can save up to 20% of cost required by conventional girder construction.

• **Lightweight materials** help reduce steelwork needed for the building frame. Many other applications, too.

• **Corrugated asbestos**—an easy-to-erect material for upper sidewalls. Also good for penthouse siding and regular siding.

• **Large scale construction** is preferred over small quantities of different types, due to disproportionate costs. Plaster and masonry are avoided wherever it is possible.

• **Masonry kept to low levels.** Other materials are used where scaffolding would be needed for masonry.

• **Unusual design**—a combination of imaginative engineering and careful material selection. New plants don't follow a pattern. Case in point is the unusual $6-a-square-foot plant designed and built for Filler Machine Company, Inc., by Ralph Wesley Jones, a Philadelphia consulting engineer.

• **Over-all in-place cost** has been found better than F.O.B. cost of materials for comparisons. Many materials appearing expensive at first glance turn out to be bargains, and vice versa.

• **Tax advice.** There are many legitimate ways to save money by making tax decisions first. Landscaping is one example, under certain circumstances.

• **Plant appraisal accountant**—for ambitious building programs. The B. F. Goodrich Company has a specialty accountant whose responsibility it is to get wise to building costs early.

5. Low-Cost Maintenance

Owners of new plants told FACTORY editors they had tried to build for low-cost maintenance. This means they paid a bit more for materials that will need little maintenance for years to come.

Here's a summary of the materials we found to be most popular:

ROOFS · The 20-year bonded-type built-up roof covered with tar and gravel appears to be the standout. Some companies buy a bonded-type roof and forego the bond. Instead, they buy the roof from one of the nationally known roofing companies and settle for a one-year guarantee. Other companies compromise on a 10-year or 15-year roof.

Popular metal roofs include aluminum, stainless steel, and asphalt- and asbestos-coated galvanized steel.

ROOF DECKS · Steel, precast concrete, gypsum, and hydrous calcium silicate roof decks are the most popular. Aluminum deck is growing in acceptance.

SKYLIGHTS · Corrugated, plastic-impregnated, glass-fiber panels have gained wide acceptance quickly. Owners tell us performance has been good.

UPPER WALLS · Prefabricated panels, usually corrugated and with or without insulation, are growing in use. Both exterior and interior surfaces are usually aluminum, stainless steel, or porcelain-enameled steel. Also popular are panels of mineral board, and hydrous calcium silicate.

SASH · Aluminum is giving steel a good run despite higher first cost. But a new steel sash, first galvanized, then bonderized, is designed to reduce the maintenance normally needed by steel sash.

The newer mastic glazing compounds, including those containing rubber, are fast replacing putty. Many of them come in colors to match the sash.

Where window breakage is a problem, cast and extruded clear-plastic windows are being used more and more. So is glass block. Originally limited to decorative uses, it now has definite light-control characteristics. It is gaining favor for air-conditioned areas and for upper sidewalls.

LOWER EXTERIOR WALLS · Concrete block and brick are still the most popular materials. Vitrified glazed brick can be used in dirty atmospheres. But jumbo brick (double size) and metal panels are growing in use. Precast concrete panels look like real contenders here, too.

INTERIOR WALLS · Glazed structural tile and plain or painted concrete block are the materials most often used. Advantage of the tile is the fact that it comes in attractive colors and can be washed or hosed down.

Where metal panels are selected, they are supplied as a complete wall. If insulated, a 4-in.- thick panel is simply bolted to the frame, with considerable space-saving over equivalent masonry.

PARTITIONS · In factory areas, glazed structural tile is making big gains. Where truck traffic on ad-

ALUMINUM SIDING, for easy maintenance, was used for sidewalls of Pratt & Whitney branch plant, North Haven, Conn.

STAINLESS STEEL ROOF—to withstand corrosion — uses standing lock seam construction. Gutter joints are soldered.

joining aisles is anticipated, steel bumpers are being set in the tile partitions to protect them.

For offices and supervisory offices, movable partitions seem to get first call. Where relayouts are frequent, they're ideal. Maintenance is easy. And, because of their inherent strength, these partitions are made thin and therefore save space. They are available in painted steel, aluminum, mineral board, and other minerals.

RESTROOM WALLS · Glazed structural tile or face tile is almost universally used. It resists stains and markings, and it's easily cleaned.

FACTORY FLOORS · Surface-hardened concrete is most favored. Its surface is dense and smooth. It can be painted, waxed, sealed, or left untreated. Mechanical floor cleaning equipment will keep it clean with little difficulty.

Where the processes and equipment are relatively light and clean, hard maple floors still find favor with many users.

If frequent changes must be made in underfloor service, the type of construction used in Hamilton Standard Division's (United Aircraft Corporation) new Windsor Lock (Conn.) plant appears to be a good answer. It's a 6-in. reinforced concrete floor, followed by a 4-in. layer of low-strength concrete, and topped with a course of wood block. Service lines are in the low-strength concrete layer. When they need to be changed, the wood block can be lifted and the concrete channeled for new runs;

GLASS BLOCK PANELS and clear-vision windows combine utility and good appearance in new Hytron plant, Danvers, Mass.

Turn the page

then it's filled in and the wood block is replaced.

Where particularly rough wear is expected, floors are often armored by casting grids of steel flush with the surface.

OFFICE FLOORS · Rubber, vinyl, and asphalt tiles have taken the lead. Hardwood, of either the strip or parquet type, is still going strong.

OFFICE CEILINGS · Suspended ceilings of aluminum, steel, fiber, or mineral panels are found in most new plants. Panels come in convenient sizes and are laid in channels formed by T-sections. They may be removed easily and cleaned or painted, depending on the type of panel used.

PAINTED AREAS · Rubber-base paints, like those so popular for home use, have made a tremendous hit with industry. They are being used for walls, partitions, and ceilings in a variety of colors. Also growing in use are the still newer alkyd resin paints. Their durability is said to surpass that of standard enamels.

CORROSION · Where the right materials were used to start with, FACTORY found many corrosion problems have been licked. Better materials are available to resist corrosive elements. Over acid baths, for example, the new plants are using aluminum hoods and ducts — or aluminum structural members and decking if the fumes can't be controlled. Acid-resistant tile has been found excellent for the floors. Stainless steel or clad metals have been designed to resist alkalis.

6. Better-Looking Plants and Grounds

Today's plants are trim, clean-looking, and functionally modern. Both urban and suburban plants —even plants that are built miles from the nearest community—are being designed today with an eye to community relations.

One plant, in particular, located on a lonely country road in the hills of South Carolina, would easily rate as one of the most attractive new plants in the country. Sooner or later a community will grow near this plant. And then its attractiveness won't be wasted. It's a smart way to design for the future.

This idea was put to us most appropriately by Herbert P. Bailey, president of Rotor Tool Company, whose new plant is described on page B-94.

He said, in effect, "For $2500 extra we got a facade that will attract potential employees and cause people to notice and admire our new plant."

Or consider General Electric's philosophy at Louisville, where it will make household appliances. Company executives want Appliance Park to imply cleanliness and tidiness. They believe this atmosphere is good for employees, neighbors, and visitors.

EMPLOYEE ENTRANCES · Companies used to doll up the front office and forget the rest of the plant, including the employees' entrance. Now there's a trend toward arranging the plant so everybody enters the front door. Where that isn't convenient, the alternative is to dress up employee entrances.

MODERN MATERIALS · Industrial builders are still using limestone, sandstone, and granite. But FACTORY editors found increasing use of the newer and lighter shades of brick, as well as colorful rough stones, both artificial and natural.

Many of the new plants of 1952-53 are using aluminum or stainless steel for doors, sash, and panels.

Picture windows, 4 x 6 feet and larger, are being used more and more, primarily in front walls of the office sections.

EMPLOYEE ENTRANCE at new Sheaffer plant, Fort Madison, Iowa, gets same beauty treatment as front entrance.

LANDSCAPING · Sign of the times is the annual contest run by the Cleveland Chamber of Commerce to create community interest in plant beautification. Whether in a city lot or on rolling acres,

a plant looks unfinished without evergreens, flowering shrubs, and other colorful plants. Neat lawns are important, too.

RECREATION · There's a strong trend toward incorporating employee recreational facilities with plant beautification. Many of the new plants provide such things as picnic groves, tennis courts, badminton and shuffleboard courts, softball diamonds, and quoit courts. Stone Manufacturing Company, Greenville, S. C., will have a large swimming pool for its employees.

Delco Products' new plant near Dayton already has an 8½-acre spring-fed lake for employees who want to fish. In addition, Delco plans to set up a trap-shooting area and a field house.

7. Better In-Plant Environment

Workers who own comfortable and attractive new homes are more conscious of comfort and beauty in the plants they work in.

That's only reasonable when you consider the average worker spends as much or more time at his job than he spends awake in his own home.

In some ways industry is still behind the times in providing a better working environment. But the trend is strongly in the direction of improvement.

BETTER SEEING · Plants are being built not only with better lighting, but also for better seeing. This is being achieved primarily through more effective use of color and light.

FACTORY editors found a definite trend toward maximum use of color. More than ever before, machines, plant service equipment, and miscellaneous equipment are being painted in color. In plants without air conditioning, dust and fume control equipment is making it practical to use lighter and more delicate hues.

LESS GLARE · Actually this is a part of better seeing, but it's important enough to be recognized by itself.

A sizable number of today's new plants provide some way to reduce glare. Glare-reducing glass, broad eaves, venetian blinds, light-deflecting screens, glass block—all are being increasingly used both in factory and office sections.

Tinted glass, for instance. Many companies specify it for south and west exposures; others put it on the east side, too. And some have put it on the north exposure. Some companies put it in all sash. Others put it in all rows except the bottom two.

A few plants have already discovered a new aluminum heat-deflecting screen. More will. It cuts glare, is said to keep factory interiors up to 15 degrees cooler.

NOISE REDUCTION · As machines get bigger, they are likely to make more noise. It's a real problem. It's being handled in the new plants mostly by isolation. Acoustical partitions and ceilings are doing the trick. The workers in the vicinity of the noise-making machinery don't escape it, but it's prevented from spreading to all areas. Acoustical ceilings are a *must* in most offices.

There are two kinds of acoustical panel for office areas—perforated and solid. The solid panel traps noise within itself. The perforated panel depends on the dead air space above to muffle the noise or on insulation batts resting directly on the upper sides of the panels. Acoustical plaster is also being used for sidewalls and ceilings.

ROOF INSULATION · Most of the new plants have some sort of insulation in the roof—usually fiberboard, glass mats, or foamed glass planks. One to two inches of insulation is average.

Its purpose is twofold. It keeps the sun's heat *out* in summer, the plant heat *in* in winter.

Two other materials—aluminum foil, preferably bonded to roofing felt, and white stone chips—are used to cut summer radiation.

Sidewall insulation is being more widely used, depending on process or latitude. But several companies that have built many plants just insulated the roof and let it go at that.

Without insulation, a roof can still be cooled in one of two ways. Properly constructed, it can hold a roof pond. Or roof sprays can be installed.

BETTER PLANT OFFICES · The foreman is getting his private office in most new plants. He needs space for records and confidential talks with employees.

Usually these offices give the foreman a complete view of his own area. For flexibility, many are built of movable partitions. And many have acoustical ceilings. All have good lighting.

8. Fast Construction

Laymen are often astonished at the rapidity with which new plants rise. Huge plants can be built and turned over to their owners in a few months' time. The secret lies in excellent owner-architect-contractor liaison and in precise scheduling.

Objective of this speed, of course, is to build faster and begin operating and earning sooner.

FACTORY editors found many new construction jobs based on the principles below. But architects, engineers, and builders tell us there's lots of room for improvement:

1. Develop objectives early, preferably long be-

PRECAST SPANDREL BEAM and canopy is positioned by cranes on cast concrete columns early in construction.

CONCRETE WALL PANEL goes into place quickly. Lifting lugs as well as reinforcing bars (for floor) were cast in panel.

RIGID FRAMES fit together like an Erector set, saved Willard Storage Battery Company six months' construction time.

fore thinking about either an architect or a builder.

2. Work out handling methods. Have the plant engineer work with production people to develop an economical floor plan and plant service layout.

3. Let one man call the shots. Designing and building a new plant requires many fast decisions. You can slow schedules tremendously by not channeling all questions through one key man.

4. Base the building schedule on mill rollings of steel. One well-known builder said: "We take a contract, order the steel, and then work on other projects for three months. Meanwhile our new client chews his nails. Then we jump back to his project and really keep things moving. That way we save a lot of time and keep our costs down."

5. Use newer types of building materials—the kinds that can be erected fast:

Wall panels. They are available in two basic types, insulated and non-insulated, and in two kinds of materials, metal or mineral. They come ready for use or knocked down for field assembly.

Chief advantages of the metal panels are light weight, single-unit construction, quick installation, low-cost maintenance, and space saving.

Metal panels are made of aluminum, stainless steel, steel, porcelain-enameled steel, galvanized steel, and asphalt- and asbestos-coated galvanized steel. Surface patterns include corrugation and embossing.

Grumman Aircraft Corporation's new Peconic River (Long Island) plant will have a panel wall made like this: Panels will be 5 x 7 feet and about 4½ inches thick. The exterior face is to be 20-gage anodized aluminum. The interior face will be 20-gage sheet steel. Between the two faces will be a 4-in. core of fiber insulation. Insulating qualities are said to be equal to 12 inches of masonry construction. Such panels go up fast.

Chief advantages of the mineral panels are relatively low cost, quick erection, and durability. Materials include concrete, insulated concrete, mineralized wood chips, asbestos cement.

Other wall materials. Masonry walls are still popular, but labor cost is almost prohibitive in some areas. To get around this, materials suppliers are pushing materials like jumbo brick, jumbo block, adobe block, pre-finished block and lightweight block. The basic trend is to bigger masonry sizes.

6. Use newer construction techniques: Concrete floors can now be laid by highway pavement machines, assuming the job is big enough and the contractor can get the equipment.

Concrete walls can be cast in place. Or they can be cast on the floor slab and tilted into position. The latter method is reliably reported to save up to 40% of the cost of masonry. And it's unquestionably faster. Panels can also be cast elsewhere, trucked in, and crane-erected.

Ceilings and upper floors can be cast on the floor slab and jacked up the building's pipe col-

umns into position hydraulically by the Youtz-Slick slab-lift technique. When the reinforced monolithic slab is in position, cast-in-place anchors are welded to the building's pipe columns.

Columns and beams can be precast or cast-in-place reinforced concrete. Cast-in-place columns were used for Naugatuck Chemical Company's new Los Angeles plant. In this process, forms are erected for columns and filled with concrete. The column is cast where it is to stand in the finished plant.

7. Use standard buildings. They are available from a number of reputable manufacturers, can be used as warehouses, light-assembly buildings, or heavy-fabricating and assembly plants. Generally, they're cheaper than custom-built plants, and go up faster.

Willard Storage Battery's new Allentown (Pa.) plant was built over standardized rigid steel frames in half the time it would have taken to procure and erect steel for a custom-designed plant.

9. More Office and Engineering Space

There are two main reasons for this trend. First, the amount of engineering needed to manufacture goods is increasing rapidly. Second, the government is complicating the task of bookkeeping.

There is faint hope that records required by government bureaus will diminish in quantity. You can be certain the trend to more engineering will remain strong.

Yet FACTORY editors found a number of new plants have not considered these needs and planned for or provided enough space for future needs. That includes not only basic office space, but also cafeterias, cloakrooms, restrooms, lounges, meeting rooms, laboratory space, supervisory offices, production offices, drafting rooms, engineering rooms, filerooms, and supply rooms of one kind or another.

There are other angles to this basic trend that bear consideration. For one thing, facilities for white-collar people are more efficient. They don't have to be "plushy."

Space utilization is more important than ever. Yet the trend seems to be toward partitions. Some companies maintain that at least part-way partitions are needed to guarantee privacy and efficiency. Others hold that all office employees should be in one big room; better supervision is the reason. In some of the new plants, even the supervisor's desk sets out in the open. But we're betting on growing use of partitions.

10. Bigger and Better Parking Areas

Perhaps no employee relations problem of the past few years has been more acutely distressing than parking. The best way to cure it and avoid later gripes is to provide plenty of space. The new plants are doing so.

Lots of the better new plants have dense, smooth pavements over compacted subsoil. Most are equipped with generous drainage systems.

FACTORY editors found individual car stalls well marked with durable paint and areas well patrolled for sloppy parkers.

Companies that pick sites in urban areas or in crowded suburbs are apt to be in for parking trouble. Whatever solution they find will be costly. One plant, now a-building, will have space for 500 employee cars on its roof. Can you picture the jam when 500 employees converge on the "up" ramp in the morning, and on the "down" ramp at the end of the shift? Clearly, careful traffic planning is imperative in such a venture.

What's the proper ratio of employees to cars? One General Motors division figures it's 1.2 people per car. A lot of plants use similar factors. The trouble is, they don't anticipate big increases in employment. Further, if you work a second shift, parking space must be almost doubled.

ENTRANCES AND EXITS · Planners of today's new plants have given this problem some attention, but we're a long way from having the full answers.

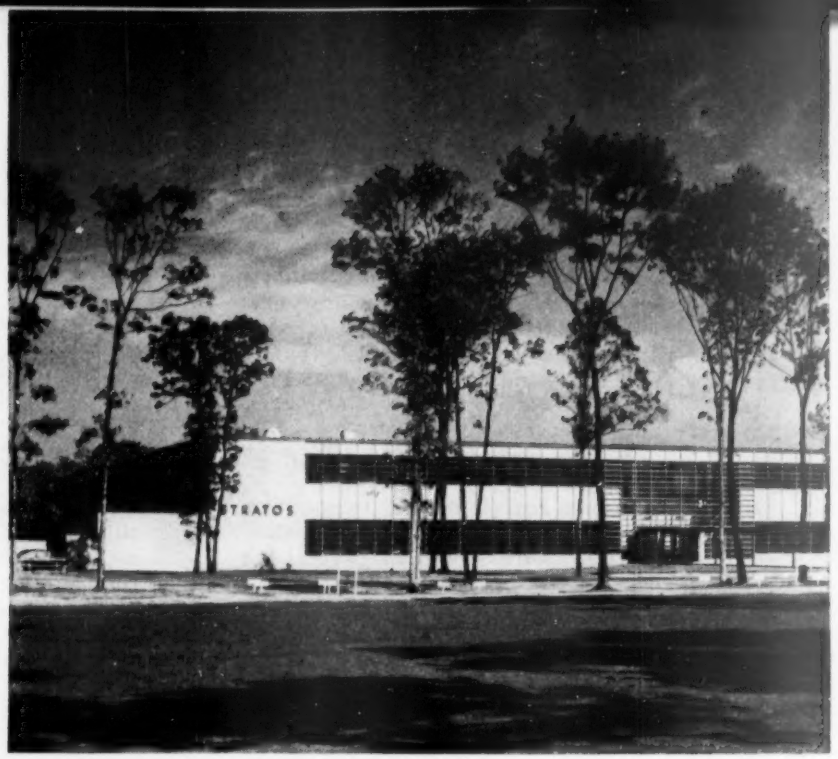
The problem is to get employees' cars into the parking areas fast in the morning and to get them onto connecting roads fast at night.

At General Electric's Appliance Park (Louisville) employee roads and plant-traffic roads will be separate to prevent snarls at shift changes.

Another solution is to separate the parking areas for the various shifts, with separate exits and entrances. More big plants have parking areas on two and three sides of the plant.

PARKING AREA at Duncan Electric (see also page B-90) is right beside the plant and connected to it by walkways.

BETTER PLANTS
for today's...
and tomorrow's...
needs



Designed to Be a Good Neighbor

A SIGNIFICANT PLANT OF 1952-53

NAME:	Stratos Division Fairchild Engine & Airplane Corp.
LOCATION:	Bay Shore, L. I., N. Y.
PRODUCT:	Precision pneumatic accessories for aircraft
EMPLOYEES:	700
ARCHITECT:	Fordyce, Hamby, Strobel & Panero
DESIGN CONSULTANT:	The Raymond Loewy Corp.
BUILDER:	John W. Harris

DROP A GOOD-LOOKING functional building of glass and steel into the middle of a Long Island estate—and you have the new Stratos plant. Designed with an eye to good community relations, to fit into predominately residential surroundings, it looks as if it really "belonged."

Manufacturing and testing areas are housed in a single-story structure, while offices and employee services are in a two-story L-shaped building.

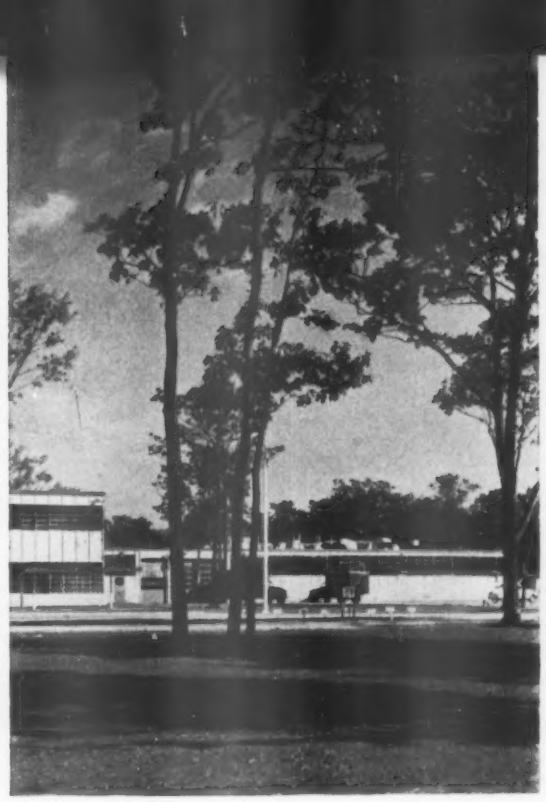
The plant has a structural steel frame with no load-bearing walls. The exterior curtain walls are supported by the steel frame and based on a light-weight brick wall.

Metal mullions (vertical) and muntins (horizontal) divide outer walls into modules. The 4-ft. interval between mullions standardizes the width of windows and panels, thus permitting interchangeability.

FLEXIBILITY · Fixed and semi-fixed facilities are on three sides of the manufacturing area. The one inflexible section, the test cells, is situated along one side. On the other two sides are shipping and receiving areas, engineering, and personnel.

The 20x40-ft. spacing between structural supports and the steel-reinforced, single-level concrete floor permit easy relocation of machinery.

New holes for exhaust units can be cut in the



NATURAL ATTRIBUTES OF THE SITE, formerly a private estate, add to the architectural simplicity and beauty of the Stratos plant. Exterior view of the 2-story L-shaped section, which houses the office and employee facilities, and adjoining factory shows varying fenestrations made possible by the extreme flexibility of the modular wall design.

EXPOSED STEEL MEMBERS and modern furniture in the reception lobby typify the functional design of plant and offices. In the general office area, exterior I-beams are visible and hung ceiling is simple acoustical tile.

lightweight premolded roof decking, which has good thermal and acoustical properties.

Production offices have movable partitions.

EXPANDABILITY · Considerable preplanning was done to establish immediate or foreseeable requirements and to forecast long-term needs.

In establishing immediate needs, allowance was made for some expansion within the 94,000-sq. ft. manufacturing area. The floor was designed for increased loads; extra service capacity was installed; additional test units were incorporated.

Fixed facilities face inflexible property boundaries. Stratos owns enough land on the north side to more than double its manufacturing space.

Exterior curtain wall construction permits expansion without interruption of production.

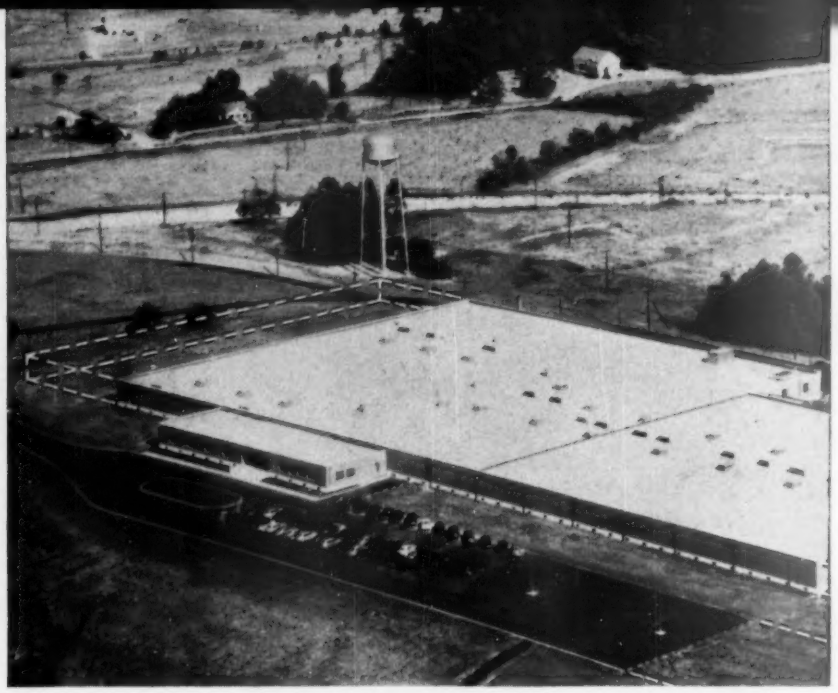
OFFICES · Drafting room illumination, originally 50 foot-candles, is being increased to 75.

LOW COST · Functionally adequate structures and furnishings have overruled luxury items.

EMPLOYEE FACILITIES · Plant has modern cafeteria, spacious locker rooms, and good recreational facilities. Elaborate recreational program is unnecessary because of the proximity of Long Island beaches.

EXPANDABLE CURTAIN WALL on the north side of the Stratos plant is free of all obstructions. This non-load-bearing wall, like all the building's exteriors, is only bolted to the superstructure.

BETTER PLANTS for today's... and tomorrow's... needs



FUTURE EXPANSION (shown by dotted lines) will extend both ends of new, windowless, single-story White Horse Mill. North extension (left) will be 112 x 325 feet; south extension,

Planned for Quick and Easy Expansion

VISIT ANY NEW TEXTILE PLANT in the South—and you're pretty sure to find a single-story, windowless building with excellent facilities for employees.

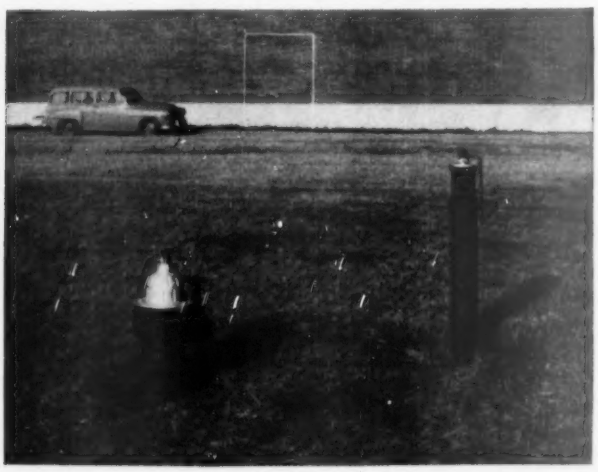
The new White Horse Mill near Greenville, S. C., is no exception to the rule. What advances it to the head of the class are the many provisions made for expansion. Shown here are some of the ways company engineers planned for the future.

A SIGNIFICANT PLANT OF 1952-53

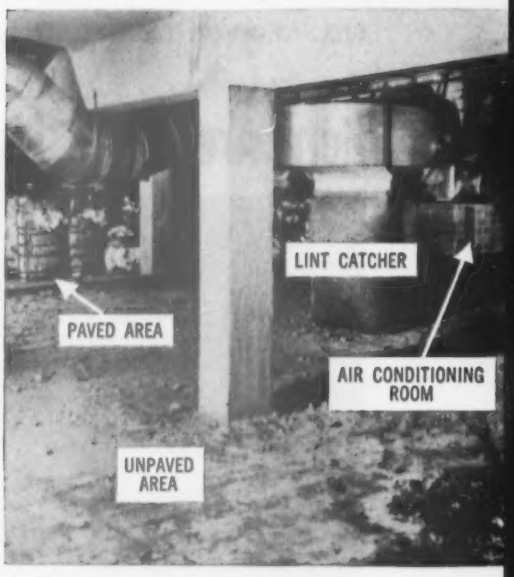
NAME: White Horse Mill
LOCATION: Greenville, S. C.
OWNER: Maverick Mills Corporation, East Boston, Mass.

PRODUCT: Cotton cloth
EMPLOYEES: 300

ENGINEER: John McElroy, Maverick Mills
BUILDER: Daniel Construction Company, Greenville



80 x 275 feet. Front parking area will be extended to south.



INSIDE EXPANSION SPACE is provided by partly unpaved basement. Unfloored, clay-surfaced areas can be deepened with scoop-type tractors to make sunken bays for more textile machines if and when they're needed. Tractors can carry out earth and bring in cement by ramp. Present headroom of the 212,000-sq. ft. basement is 7 feet 4 inches. Paved areas are occupied by aisles, shops, cotton-bale storage. Basement sprinklers, complete with heads, are already installed. Photo shows air-conditioning room (right) and lint catcher (right center).

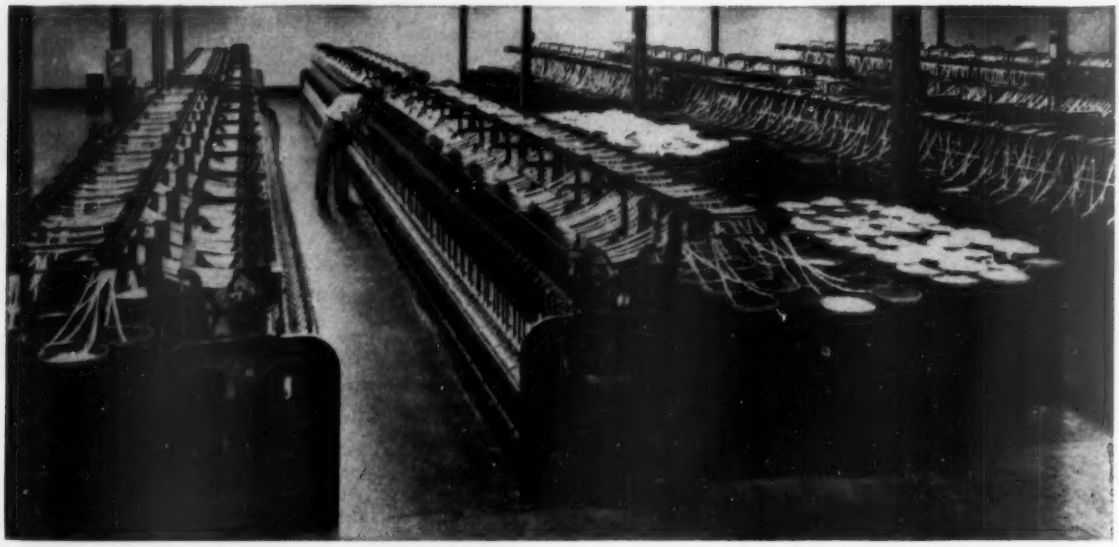
SERVICES CAN BE DROPPED to future machinery in basement because piping and wiring are carried through beams under main floor. Future needs were also anticipated by providing piping and wiring with extra capacity. Open wiring can be tapped at any point. All services are protected but accessible for maintenance and extension. All service lines pass through pipe-lined holes about halfway up 26-in.-deep beams. Shown here are conduit, air, water, sprinkler, and vacuum-stripping lines.

OUTSIDE EXPANSION was anticipated with these preparations for future extensions at each end of mill. Bricked-in doorways (outlined in white) were made by interrupting masonry courses. Hydrants and division valves on main fire-protection loop were set beyond extension limits so fire mains won't need moving. End wall here is permanent. Extension can be made by adding foundation, floor, roof, and three walls for the new area.

ROUGHED-IN BASEMENT DOOR (right) will lead to future extension. Other preparations: Piping was capped on either side of last beam; power lines were sealed between last beam and foundation wall at right; holes for added piping were left in beams and smear-sealed; empty piping was carried through floor so that extra lines can be snaked through easily.

Turn the page for other reasons why White Horse Mill was selected as a significant plant of 1952-53.

Here Are Other Plant Features



CARDING ROOM is typical of spacious areas provided by clean design. Ceiling height, uniform and low throughout mill, is 13 feet. This increases lighting efficiency, reduces air conditioning requirements. Illumination is approximately 50 foot-candles. Aluminum air-conditioning ducts are pressed in diamond pattern to prevent resonance. All floors are 8-in. reinforced concrete and surface-hardened (Kalman process). Steel bar grid cast in floor in foreground prevents excess wear by storage drums, which are slid between machines. All interior walls are finished with 2-in. structural glazed tile from floor to ceiling.

SEWAGE TREATMENT PLANT can handle more than twice its present load. It treats 15 gpm., will actually treat 35 gpm. Sewage flows about ¼ mile downhill from mill through 8-in. pipeline, along which four manholes are spaced. It first enters a 1½-hp. masticating unit that minces solids. Then it flows into first treatment tank (accelerator), where solids are settled out with the aid of clay and aluminum sulfate; these are metered by separate flow-meters in brick building. Building also houses 5-cu. ft. air compressor that feeds air into accelerator for aeration. Solids are blown down automatically, then pumped to digester where bacterial action turns them into an odorless sludge. Meanwhile, liquid drains to a nearby creek, its biological oxygen demand reduced to safe range of from 16 to 20. Every three or four months, digested solid matter is pumped from digester 100 feet downhill to concrete drying bed. There cake, formed as matter dries, is periodically shoveled out and used as lawn fertilizer.

LARGE LUNCHROOM is already equipped for possible future needs. Installed but not yet in use are facilities for counter service—serving window and counter with rolling steel door and kitchen space behind wall at right. Meanwhile, employees are served by vending machines, which dispense sandwiches, doughnuts, cake, cookies, ice cream, coffee, soft drinks, and two kinds of milk—plus such items as cigarets, hand lotion, aspirin, and alkalizers. Two coin-changing machines are also on hand.

Other Provisions for Expansion at White Horse Mill

• **Storm drains can be tapped** at either end of the present building to handle run-off from the future extensions.

• **Substation capacity is high enough** to supply power for new looms and spinning machines.

• **Wells are deep and pumps** are big enough to pull plenty of water for future use.

• **Water storage capacity** is large. Two reservoirs will hold ample reserve water—500,000 gallons—at good pressure.

• **High-pressure boilers** are capable of supplying plenty of heating water. If greater boiler capacity becomes necessary, two more packaged units can be added in the space provided.

• **Switchgear is ready for more load.** And another panel can be placed in the switchgear room if desired.

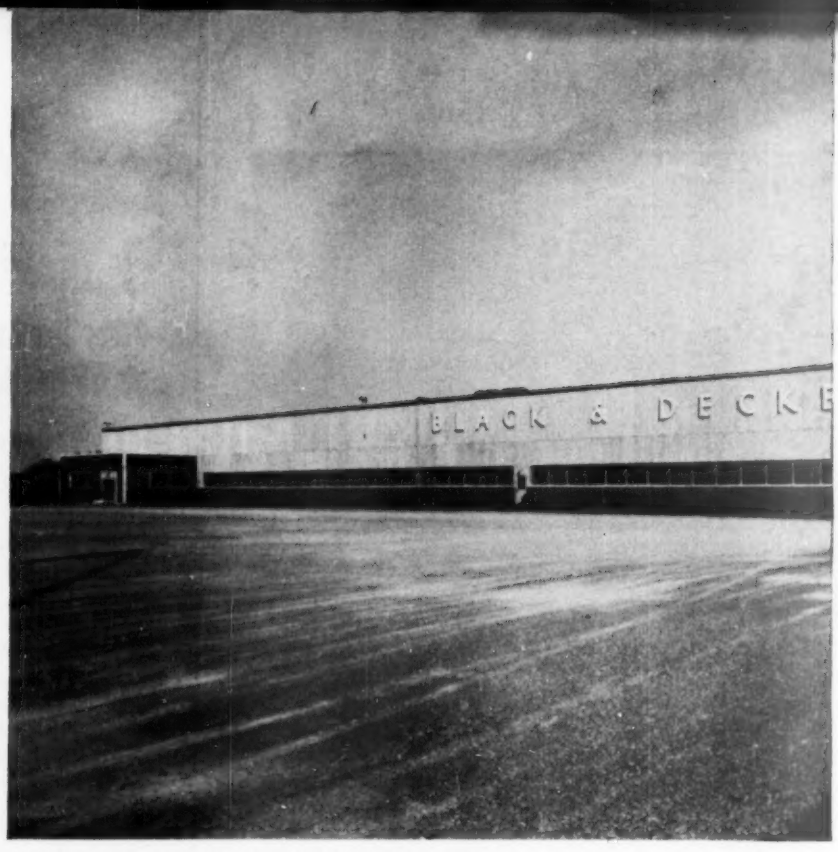
• **Offices are spacious enough** (total 40 x 125 feet) to handle twice the present staff with ease.

• **Air conditioning units can be added** in the extension basements to condition extensions. If the basement is occupied, additional rooms can be sandwiched between present units.

• **Floor capacities are ample** for any reasonable loads. Machinery weight can be increased—or more machinery added—without fear of overloading.

• **Parking space can be extended** as the plant grows. The present area holds 114 cars. Expanding it will simply be a matter of adding crushed stone and blacktop. The mill road will handle more traffic easily.

BETTER PLANTS for today's... and tomorrow's... needs



DESIGNED FOR QUICK, LOW-COST EXPANSION Black & Decker plant has been in operation only a year but is already doubling in size. Only low brick sidewalls need be

Year-Old Plant Already Doubling Its Size

A SIGNIFICANT PLANT OF 1952-53

NAME: The Black & Decker Mfg. Co.
LOCATION: Hampstead, Md.

PRODUCT: Portable electric tools
EMPLOYEES: 500

DESIGNER, ENGINEER, AND BUILDER: The Austin Co., Cleveland

WITH THE PAINT BARELY DRY on the plant shown here, Black & Decker has announced plans to more than double its size immediately.

Therein lies the quick pay-off in planning for expansion.

The 110,000-sq. ft. plant was erected in 1952. And it was planned for future growth in any of three directions.

Several features included in the original planning will simplify the plant's growth:

- **Land is adequate.** Black & Decker's older plant at Towson, Md., was too cramped on its 30-acre site to permit more growth there. So a large site at Hampstead was selected to permit eventual expansion to 1-million square feet of office and manufacturing space. The new 185-acre site will easily accommodate a plant of that size.
- **The site is level.** The idea was to grade the entire site so little excavation and preparation will be needed for any future growth.
- **The walls are movable.** Only the 4-ft. brick lower wall must be sacrificed in the future. The bands of continuous sash can be salvaged and moved. So can the corrugated asbestos-insulated panels in the present upper wall. And because the first expansion was planned for the west wall, the lower wall on that side was built of concrete block instead of brick.
- **Parking space is ample.** Maximum potential

sacrificed as the building spreads out. It can grow in three directions.

FLEXIBLE PLANT has wide column spacing (40x60 feet) and a clear height of 16 feet. Subsequent layout changes can be made easily as a result.

employment was anticipated and parking space planned for. Eventually, an underground corridor will connect the plant with the parking lot.

• **Utilities were planned for expansion.** They can take care of the announced addition without difficulty. Then, as future additions are made, they can be expanded readily to handle the loads. Capacity was provided in the outdoor substation, for example, for doubling the present connected load. All that will be needed in the new addition will be another 750-kva indoor substation.

Other utilities, including water supply and waste treatment, were designed for more load now and can be expanded to the maximum later.

Flexibility Important, Too

Expandability is one thing, flexibility quite another. What Black & Decker executives really wanted was a design that will be as modern when the last plant addition is made as it is today.

To get that result, engineers analyzed manufacturing requirements and settled on 40x60-ft. bays with 16-ft. clearance to the trusses. Future relayouts, therefore, should not be hindered by the building's frame.

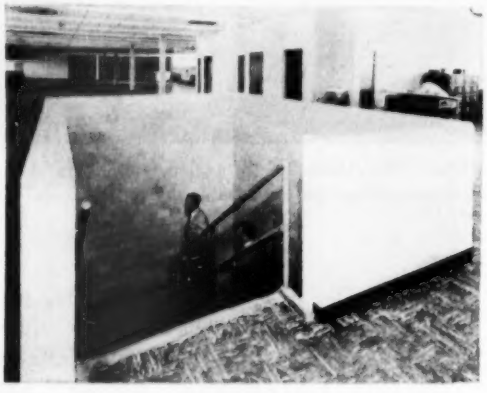
Floor loading was analyzed, as well. Result was a floor of uniform strength throughout the plant. Atop a 6-in.-thick, mesh-reinforced, concrete slab is a 2-in.-thick layer of wood block. The floor will handle a live load of 400 pounds per square foot comfortably. One objective was high stacking anywhere in the plant.

Banking on greater use of highway trucks in the future, Black & Decker provided a fully enclosed dock for six trucks. But, because rail shipping and receiving are also important to the company, a spur track leads into the plant. There a fully enclosed siding, equipped with overhead crane, can accommodate two freight cars.

TRUCK DOCK shelters six top-size trucks at once. Dock boards are hydraulically operated. Inner doors save heat.

Quick Ideas for...
Buildings and Grounds

Want help in locating housing near your new plant's location? Southwest Research Institute, San Antonio, is offering its services to industry anywhere on an at-cost, non-profit basis. It's prepared to (1) determine requirements for employee housing; (2) analyze existing housing; (3) arrange for purchase of land; (4) advise on selection of land and community planning; (5) arrange for sale of lots to builders and control type, size, and design of homes and rental units; (6) supervise planning, design, financing of shopping centers.



No need to enclose stairwells in factory offices, thinks Delco Products Division, General Motors Corporation. At its new Dayton plant, Delco has provided open wells made of structural tile. Ventilation and lighting are improved. The well is considerably less costly to build. Doesn't create an ugly island, either.

Prefabricated piping can speed construction. Several contractors have told us they have facilities for shop fabrication, with the result that field erection is faster. There's respectable cost saving, too. Of course, it takes more engineering. High-pressure pipe can be fabricated by manufacturers according to your specifications. Some suppliers will X-ray every inch of it and pressure-test it also. This protection is often worth paying for.

A sprayed-on acoustical material may be the answer to your factory or office noise problem. Thermacoustic, one of the newer materials in this field, deadens sound, offers a high degree of insulation ("K" factor, 0.27), and is an effective fireproofing agent. Maker says it is especially adaptable to monolithic installations on ceilings and walls of any contour. *Source:* National Gypsum Company, Buffalo 2.

Ordinary pipe for columns is a growing trend in small plants. Pound for pound it's stronger than structural shapes. Easier to paint and clean. Looks good, too. Connections to other frame members can be made by welding. That's not all: Service lines (electrical and liquid) can be dropped through pipe columns. So can downspouts for roof drainage. For added strength, pipe can be filled with tamped concrete.

If mold and mildew are problems you expect to encounter in your new plant, select the proper paints or use paint additives. Newer paints, not available a few years ago, containing mold- and mildew-inhibiting agents. National Biscuit Company considers them a *must* for its plants.

New lightweight building material, called Zeprex, is one-fifth the weight of concrete and is fireproof, rotproof, and mildewproof. Density (from 25 to 50 lbs.), size, and shape of Zeprex units can be varied. First use is expected to be for roof decking, blocks, wall panels, and beams. *Source:* U. S. Plywood Corporation, 55 W. 44th St., New York 36. (See Part One of this issue, page 176.)

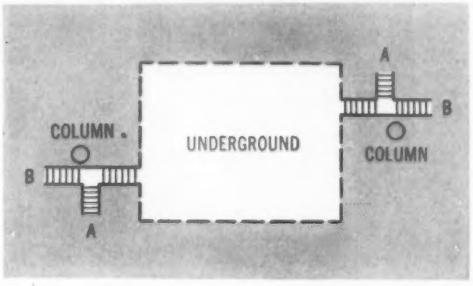
New way to look for plant sites. Arrange with the railroad, in the area you have in mind, to travel by powered handcar along the railroad trackage. When you find a likely spot, mark it on your map and investigate later. General Motors executives have used this scheme.

A new drainage roof system—that doesn't attempt to carry water off fast in large downspouts—can conserve pipe and save you money. It was developed by The Ballinger Co., Philadelphia, but can be adapted by any architect to your needs. Briefly, it works like this: Your parapet-rimmed flat roof is designed as an impounding basin. The rain water drains off slowly—as fast as the few small pipes can handle it. At Yale & Towne's Philadelphia plant, which has such a roof, water depth rarely exceeds 1½ inches, a load well within the roof's snow-load limit. The ordinary 20-year roof is quite adequate. Yale & Towne is reported to have saved $100,000 with its roof. Check local building codes before using.

Does your contractor know about soil cement, an excellent material for strengthening subsoils?

It's a cheap way to prepare bases for plant roads, parking lots, outdoor storage areas, etc. Portland cement is mixed with the soil on your site in a 1-to-10 proportion. Then it's compacted, rolled smooth, watered, and cured for seven days. Finally, black top is applied.

Keep spare ceiling panels on hand to speed maintenance. Delco Products has 50 spares. Dirty panels can be lifted out, as Jack Wright, assistant construction engineer, is demonstrating. And clean ones can be slipped in place. Or if Delco wants to repaint a ceiling, the 50 spares will be painted first and exchanged for the dirty ones overnight. Then the next day the 50 dirty panels will be painted and used for exchange.



Dual entrances for underfloor restrooms increase a plant's flexibility. Crosley's new Evendale, Ohio, plant hedged against the future, as shown in the diagram. If production lines run east and west, stairs *A* are used and stairs *B* are covered. If lines run north and south, it will be the other way around.

Put a conveyor in your cafeteria to speed removal of dirty dishes. Delco Products has a white plastic-surfaced belt, 12 inches wide, that moves at 32 feet per minute. A maximum of 6 minutes is needed to move dishes into the washroom. The conveyor is 192 feet long.

Don't forget automatic snow removal for steps, walks, ramps, roads, landings. You can remove snow electrically with cable, or mechanically with heated fluids. Cable manufacturers will help you design your systems. So will suppliers of copper tubing, aluminum tubing, plastic tubing, and wrought iron pipe. Heat is used only when snow or icing conditions develop. At other times, liquids in pipes are protected by sealed-in anti-freeze solutions. The Maytag Company, Newton, Iowa, is taking no chances with a ramp it's building for roof parking. Maytag is installing copper tubing 1½ inches below the surface of the ramp. It will run heating cable through the tubing. If the cable ever fails, hot water can be pumped through the tubing.

Ever use rubber doors? They're made of a light but tough two-ply material. Pedestrians or trucks just barge through them. They can be had with permanent magnets attached to the lower inside corners to keep them closed in a light breeze. Because they don't swing wide open, they're good for controlled-conditions areas. Said to be safe and maintenance-free. *Source:* Candor Engineering Company, Box 210, Montclair, N. J.

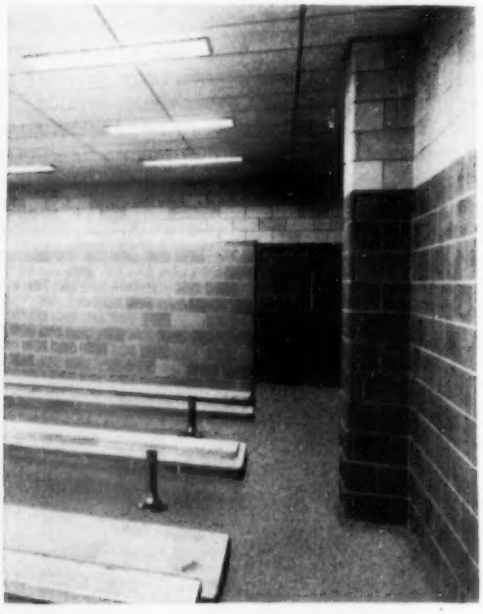
Insulated building block for masonry construction has a sealed-in layer of aluminum foil. It reflects radiant heat rays. Resists moisture. *Source:* Thermoflector Corporation, North Sioux City, S. D. Ask for local supplier.

Using exposed wood? Use rustless nails made of aluminum. They cost a little more than regular nails, but don't require countersinking and puttying. Available locally in many types and sizes.

Always get samples of materials you plan to use for analysis or comparative study, smart plant planners advise. That way, you get a first-hand look at what's to be used in your plant.

Turn the page

Also be sure contract specifies materials just like the sample. Your architect will help you work out appropriate clauses.



Pre-finished concrete blocks, growing in popularity for interior and exterior use, offer some of the qualities of glazed ceramic tile at lower cost. Here are two varieties:

Spectra-Glaze Tile-Face block is faced with a smooth, uniformly molded resin and silica-sand heat-cured coating. Because the face extends slightly beyond the four front edges of the block, a neat ¼ inch mortar joint results. Accelerated weathering tests indicate a minimum 40-year life.

Spectra-Glaze Textural block retains the natural texture of the cinder-and-slag-base block and is said to have superior acoustical qualities in the troublesome frequencies of 128 and 256 cps. This block has a thin, tough resinous glaze.

Both blocks are available in eight standard colors, but almost any color in the spectrum can be duplicated on special order. *Source:* The Burns & Russell Company, Tower Building, Baltimore 2.

Another pre-finished concrete block is also being made for interior walls and partitions. The new block is an ordinary smooth or textured block coated on one or both sides with a tough, resilient material called Kem-Krete. The dense coating is squeegeed into the pores of the block and locked in place during the curing period. Twenty colors, including black and white, are available. *Source:* The Sherwin Williams Company, General Industrial Division, Cleveland 1.

For partitions in offices and lobby, corrugated and unpolished plate glass is available in large sheets at relatively low cost. It makes excellent floor-to-ceiling partitions. This glass has given modern flair to new employees' building and some offices of H. J. Heinz Company, Pittsburgh. There are also colorful translucent panels made of bonded resins and glass fibers. They're lightweight, shatterproof, easy to erect.

New glass block for skylights, called Skytrol, was recently announced. Top photograph, posed in front of a mirror, shows both surfaces of the 12x12x4-in. block. Top surface is smooth for easy cleaning. Bottom surface is fluted for light-dispersal. Lower photograph shows

a finished installation. Block has two vacuun. cavities separated by a fibrous glass screen. This insulation combats condensation. *Source:* Pittsburgh Corning Corporation, 307 Fourth Ave., Pittsburgh 22.

Locate offices with aid of a traffic survey, as Yeomans Brothers Company did in its new Melrose Park (Ill.) plant. Here are some of the decisions Yeomans made after studying such an inplant survey: Located purchasing office nearest entrance because purchasing agent has the most visitors; isolated advertising and personnel offices because visitors to those offices seldom go elsewhere in main office or plant; placed order department next to engineering office because of frequent conferences between the two groups.

You can use steel gratings for floors of mezzanine and balcony where light storage is intended. Big advantage of gratings is that air moves through them, for better ventilation. Newer gratings offer good traction, too. Gratings are also gaining favor in multi-story process plants. They can be hosed down easily for quick clean-up. Installing them is simple—you just weld them to the building frame.

Learn how to erect brick walls and be sure your contractor gives you a maintenance-free and leakproof wall. A group of excellent reports giving instructions, step-by-step illustrations, and the reasons behind the method is available. *Source:* Louisville Cement Company, 501 South Second St., Louisville 2.

To save on grade preparation, Filler Machine Company, Philmont Club, Pa., depressed its plant and used material excavated from cut for backfill. This technique shaves excavation costs, saves time, gives plant low, lean look, and is said to reduce heating costs.

Glass-louvered windows let in breeze, but keep out rain. Called jalousies, they're popular for home use in South, are now available to industry. Ventilation is completely adjustable. Louvers move in unison. Jalousies give maximum light and are said to be leakproof. Photo shows new Florida plant of Weathermaster Jalousie & Window Manufacturing Company equipped with its own product.

Big truck-trailer combinations can drive right into Link-Belt Company's new Colmar, Pa., plant. Rails are set flush with the road so trucks can use the area inside the plant quite readily. It's not too hard to dream of a day when over-the-road trucks will drive along broad plant aisles to unload cargoes at points of use.

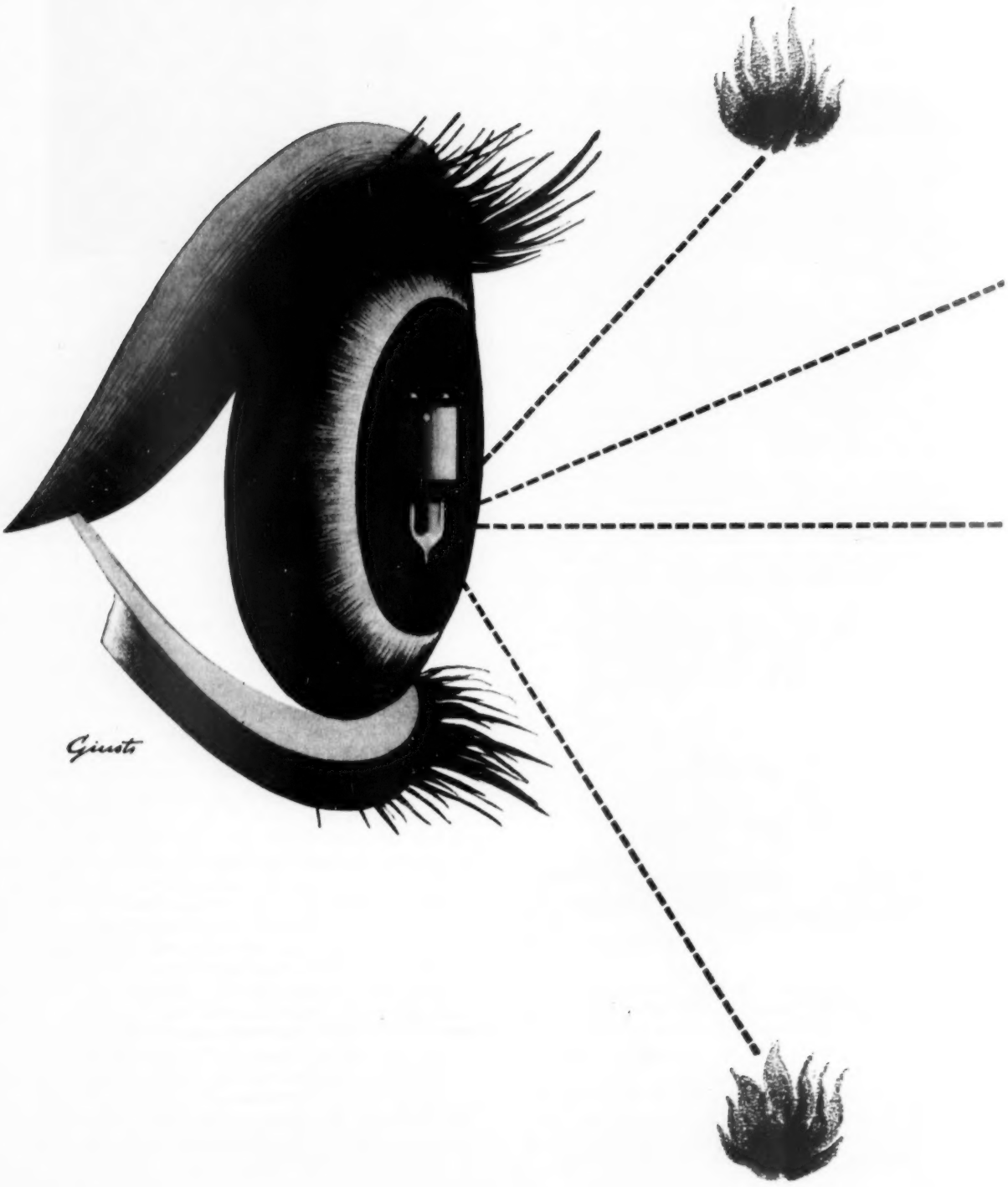
New way to acid-proof floors consists of laying sheets of acid-proof plastic over the concrete slab and then installing acid-resistant tile. Joints are filled with acid-resistant mortar. The same technique can be used to line acid tanks or vats. *Source:* Portland Cement Association, Chicago.

A good frame from used pipe is a cost-cutting idea overlooked by most companies. It's cheap to erect, strong enough for lightweight buildings. Use it for warehouses, storage areas, shop and assembly buildings. Building with 4-in. concrete floor, corrugated asbestos roof, and wall can be built for $1.83 a square foot excluding utilities, says R. G. Varner, Dollarway Rd., Pine Bluff, Ark., pipe fabricator.

Unit heaters can speed construction during winter months. Cost is low if you plan to use them later in your plant for regular heating. Idea is to mount them on skids—complete with fuel oil tanks and controls—and drag them into your plant before floor is laid. Heat they give will improve worker comfort, dry out the building, keep concrete from freezing.

Porcelain-enameled aluminum panels should soon be available in a wide variety of stable colors. Enamel researchers say the stuff adheres well to aluminum. You may want to try these new panels for the front of your plant. Check on availability with Aluminum Company of America, Pittsburgh.

Meet the instantaneous



fire detector...

fireye

"sees" fire with the speed of light

Here for the first time is a detector that "sees" flame instantly, and gives warning without waiting for smoke or rising heat. For *Fireye*, with its completely self-supervising electric-eye principle reacts with the speed of light, automatically, infallibly.

The importance of those first, few vital seconds—the period where delay can be costly and tragic—establishes the importance of *Fireye*, the fastest-known flame-detection system.

10,000 square feet protected with a single system of six eyes! Each eye scans a full hemisphere and protects an entire 40 x 40 foot room or area. Multiple systems provide complete coverage of any size areas.

Alarms or any extinguishing systems may be operated by *Fireye* detectors.

● *Chosen for the Atomic Energy Plant* in Savannah River, Georgia — chosen increasingly by others for important critical locations—you'll find *Fireye* Systems becoming the preferred fire detectors wherever equipment, materials or processes represent a high concentration of value in a hazardous area.

Are you sure of your fire protection?
With Fireye you really know!

Fireye is its own policeman—automatically supervising every electronic component part—automatically and *continuously* reporting on the job by the constant flashing of a pulse light on the control panel—automatically discriminating against other light.

A failure in *any* part of the system is indicated immediately by the trouble light and an audible trouble signal . . . so *with Fireye you know your fire detection system is on the job—not just on the premises!*

fireye

Let Us Demonstrate In Your Office!

Take only 20 minutes of your time, and let us convince you that *Fireye* is the fastest and most remarkable flame detection system today!

MAIL THIS COUPON TODAY.

FIREYE CORPORATION, Dept. FA-5
720 Beacon Street, Boston 15, Mass.

Please supply me, without obligation, all the facts about *Fireye* Protection Systems, as follows: (Check one)

LITERATURE ☐ DEMONSTRATION ☐

Name_____ **(Title)**_____

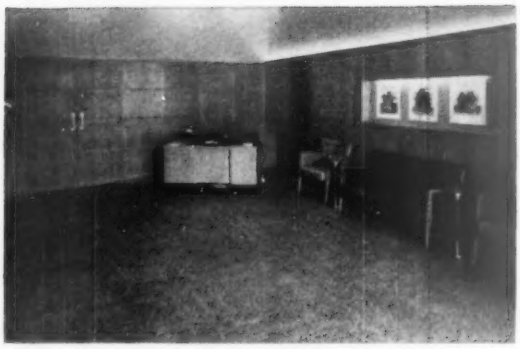
Address_____

Company_____

modern *Safe* FLOORS for today's new plants

Alundum* Aggregate and Alundum* Stair Tile

IN this machine tool plant of the future, now in reality, practical consideration has been given to comfort and safety of employees and visitors.



For appearance and safety — Alundum Aggregate in terrazzo.

When the traffic is heavy—Alundum (C. F.) Aggregate in cement floors.

Floors and stairways are safe because they have been made permanently non-slip by Norton Floors products — Alundum Aggregate in terrazzo, Alundum (C. F.) Aggregate in cement and Alundum Stair Tile.

Norton Floors not only mean non-slip protection, even when wet, but they provide extremely wear resistant surfaces practically unaffected by concentrated traffic.

Norton Floors:

Terrazzo Aggregate . . . Cement Floor Aggregate
Ceramic Mosaic Tile . . . Stair and Floor Tile.

Catalog 1935 FAC will give you helpful information on color, types and suggested specifications.

**Trade-mark Reg. U. S. Pat. Office and Foreign Countries*

Safe wet or dry — Alundum Aggregate in terrazzo.

Never wears slippery, no grooves to catch heels—Alundum Stair Tile.

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS

NORTON

Making better products to make other products better

Fenestra
BUILDING INFORMATION

Imagine Saving $50 a Door

$700 saved on 14 doors!
Count the doors in *your* building and start multiplying. Compare the cost of Fenestra* Hollow Metal Door-Frame-Hardware Units with other hollow metal doors and you'll find you can save from $50.00 to $100.00 per door with Fenestra.

Fenestra Hollow Metal Flush Doors cost less to buy because they are mass produced on special jigs that cut out a lot of expensive time and labor. This system was born of Fenestra's years of metal fabricating experience.

You save on installation cost because these handsome doors come complete with strong, prefitted, prime-painted, steel frames and shining hardware. Again time and labor are saved. There's no cutting or fitting—the door is *in* and *in use* a lot more quickly.

You save on maintenance costs because Fenestra Hollow Metal Flush Doors can't warp, swell, stick or splinter. They always open easily . . . smoothly. And they close quietly, because inside the panels is double insulation.

For strong, solid quality at unusually low cost, check on Fenestra Doors—there's a door for every purpose in the Fenestra line: Flush Entrance Doors, Flush or Regular Interior Doors with glass or metal panels, Doors with the Underwriters' B Label. For pictures and details, write the Detroit Steel Products Co., Dept. FM-5, 2266 East Grand Blvd., Detroit 11, Michigan. *®

Fenestra **HOLLOW METAL DOOR—FRAME—HARDWARE UNITS**

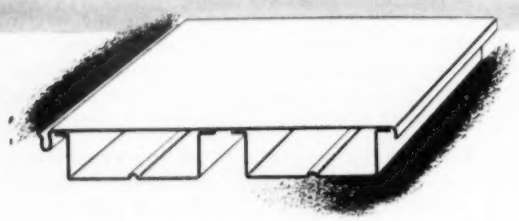
. . . save building time, labor, materials and money

Announcing new additions to the money-saving family of Fenestra Building Panels!

Here's a whole new line of modern architectural "tools"—the latest advancement in the field of light-gage steel construction.

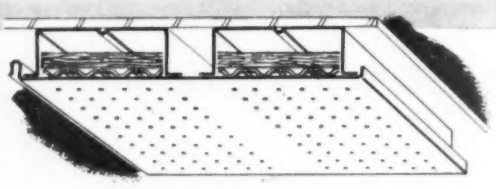
Each one of these new Fenestra* Metal Building Panels is a multi-purpose package—structural and finish material. Each is long-span, steel-strong and lightweight, saving building time, money, labor and materials.

Fenestra Engineers are ready to give you thoroughly tested data on all of these products. Please call your local Fenestra Representative or write direct to the Detroit Steel Products Company, FM-5, 2266 East Grand Blvd., Detroit 11, Michigan. *Trademark



Fenestra's New "D" Panels for Floor, Ceiling, Roof

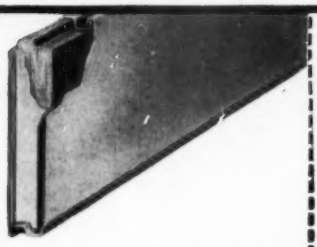
These rugged, rigid, long-span metal panels interlock quickly and easily to form subfloor, or combination ceiling and roof. They are easily arc welded to supporting structural steel. Wires, etc., can be run conveniently through the box beams. Large pipes and ducts can go between the cells. Panels are 24 inches wide, 1½ inches deep, up to 33 feet long.



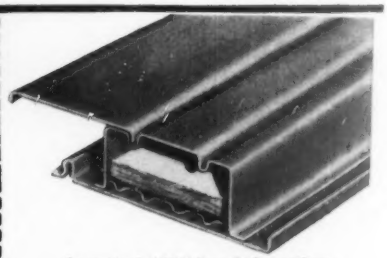
Fenestra's New "D" Panel Acoustical Ceiling

These panels are available with the flat, smooth side of the box beams perforated and with sound insulation material inside the box beam. Placed flat side down, the panels interlock to give you a beautiful finished ceiling. It's structural material and finished ceiling *in one* compact package. Fire-safe, maintenance-free. Same dimensions as "D" Panels for floors.

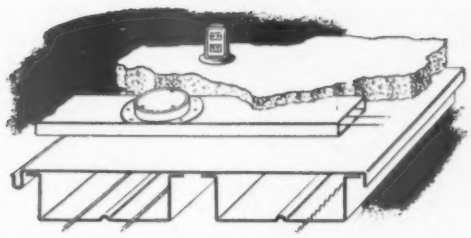
Add the new panel products, shown above, to this old, established family. Here is real latitude for architectural design.



"C" Insulated Wall Panels. Width 16". Depth is 3", installed horizontally or vertically.

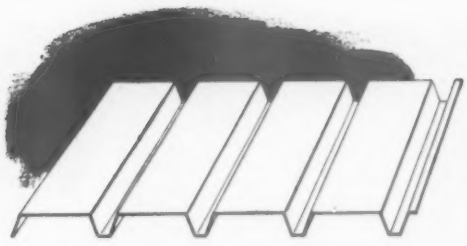


Acoustical "AD" Panels for ceiling-silencer-roof. Width 16". Depths to 7½".



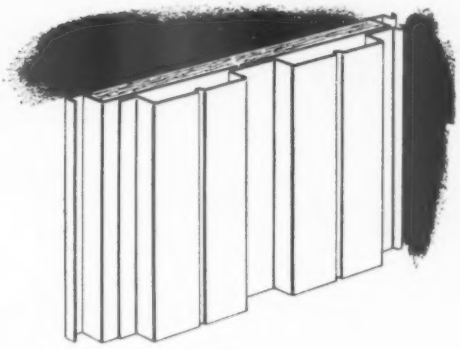
New Fenestra-Nepco "D" Panel Electrifloor

Here is almost unlimited electrical availability for the life of a building. Panel cells are 12″ on center, a 27″ duct area for the 3″-deep panel. This is adequate for all cables, including coaxial. And for a two-duct system, outlets can be spaced 6″ apart.



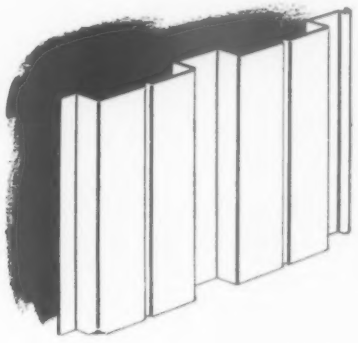
New Fenestra Econorib for Roofs

Here is 18 and 20 gage, 1½″ deep roof deck with a full ½″ rib base for purlin contact when you weld the deck down. 24 inches wide for economy of handling and for increased strength. This balanced design combines economy and strength to the "nth" degree.



Fenestra's New Fluted Wall Panels

These 24″-wide insulated wall panels are available in galvanized steel, painted steel, aluminum or stainless steel—in lengths required by job conditions. The double 1½″-deep hat sections have stiffening ribs for great strength and good architectural effect. Interlocking, telescoping ends, eliminate intermediate flashings. Insulated with 1½″-thick glass fiber for a better U value than a 16″-thick brick wall! Quickly installed inside-outside finished wall in one package.

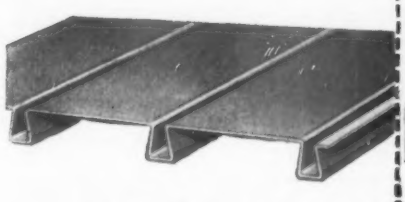


Fenestra's New Uninsulated Siding

An architecturally attractive, economical siding for use where high insulating value is not necessary. Available in 18 gage steel or 16 gage B&S aluminum. Quickly, easily installed. Fire-safe. 24 inches wide, 1½″ deep.

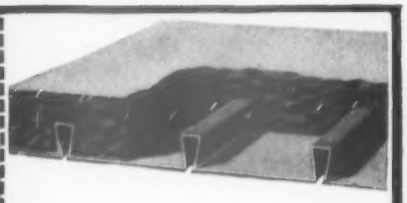
Be sure to see the Fenestra exhibit at the A.I.A. Convention in Seattle, June 16-19

Fenestra
METAL BUILDING PANELS

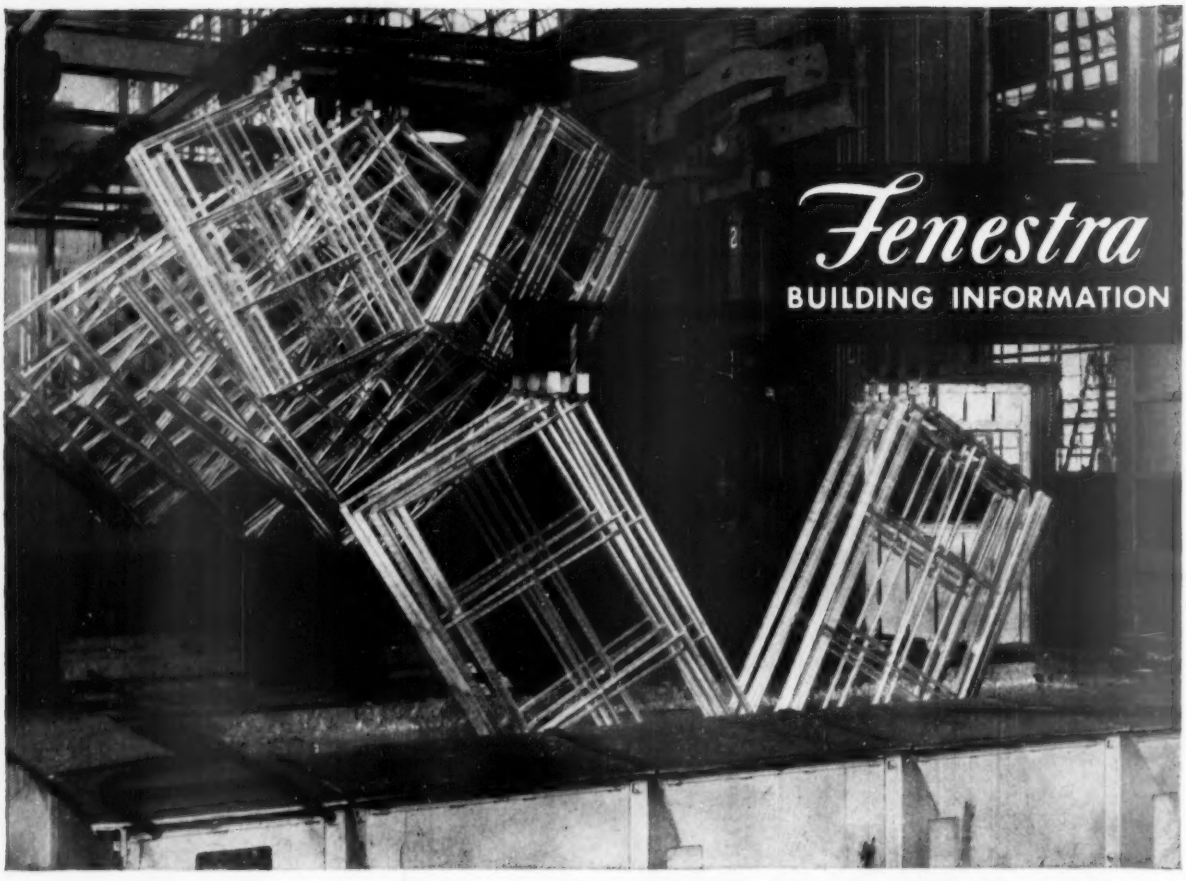


Holorib Roof Deck. 18″ wide—depth 1½″—lengths up to 24′.

Acoustical Holorib for acoustical-structural roof. Width 18″. Depth 1½″.



Holorib Reinforcing Floor Forms. 18″ wide—lengths up to 24′. Upturned pyramidal ribs reinforce concrete slab.



Fenestra Windows at one stage of Fenestra Super Hot-Dip Galvanizing

You'll Save Thousands of Dollars with these Windows!

An average plant's painting bills come to over $3,600 every few years! You can *save* this money. Fenestra* Super Hot-Dip Galvanized Steel Windows are completely protected from rust! These strong, steel windows practically eliminate expensive maintenance for the life of your building and *never need painting*. Yet Fenestra Super Hot-Dip Galvanized Steel Windows cost remarkably little.

Fenestra is the only window manufacturer with the special plant, the electronic controls, the continuous galvanizing and bonderizing process, to Super Hot-Dip Galvanize Steel Windows.

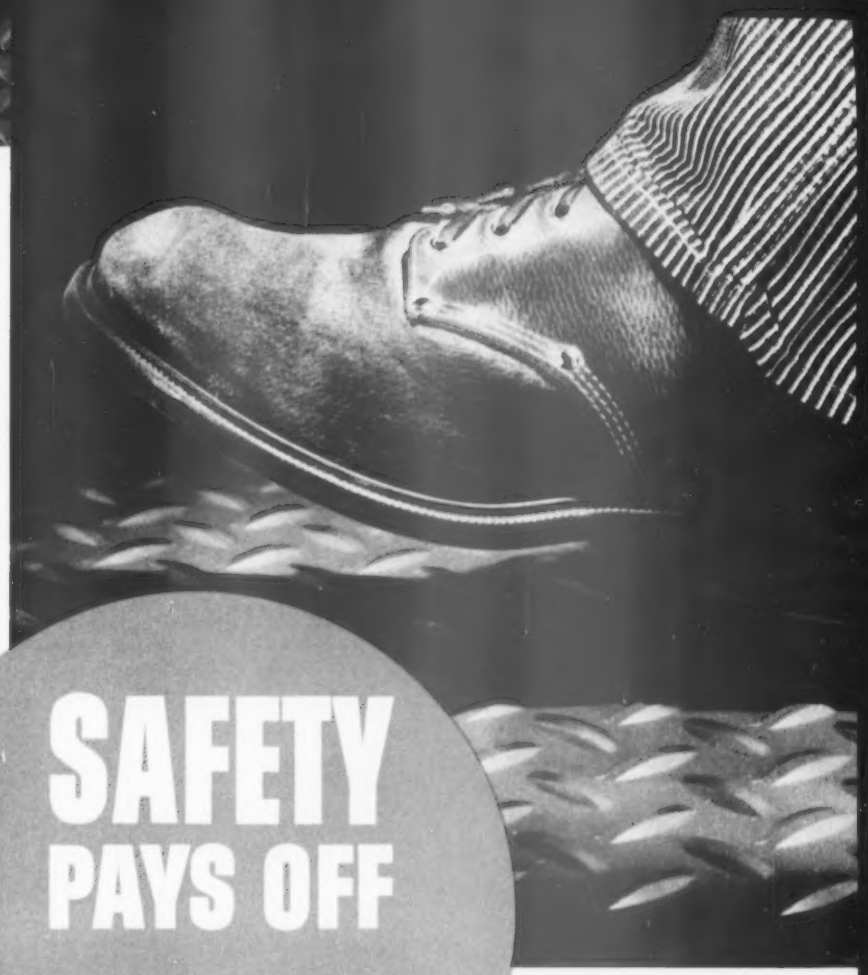
Contact your Fenestra Representative today—he's listed in the yellow pages of phone books in principal cities. And send for your free booklet on Fenestra Super Hot-Dip Galvanized Steel Windows. Write Detroit Steel Products Company, Dept. FM-5, 2266 East Grand Blvd., Detroit 11, Michigan. *®

BEND TEST shows why Fenestra Steel Windows are called Super Hot-Dip Galvanized. When two pieces of galvanized steel are bent, then straightened, some types of galvanizing crack open, leaving the steel vulnerable. The Fenestra piece *stays* protected.

Fenestra

SUPER HOT-DIP GALVANIZED STEEL WINDOWS

from the only plant in America especially designed to Hot-Dip Galvanize steel windows



SAFETY PAYS OFF

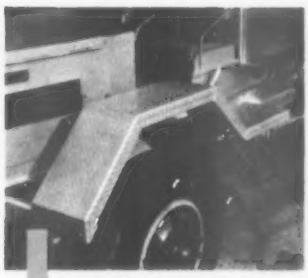
- Save Man Hours
- Pay Lower Insurance Rates
- Enjoy Better Fire Protection
- Have Happier Employees

with Industries' first choice of safety flooring

INLAND

4-WAY® safety plate

for replacement



on new equipment

in construction

4-WAY® safety plate

firesafe

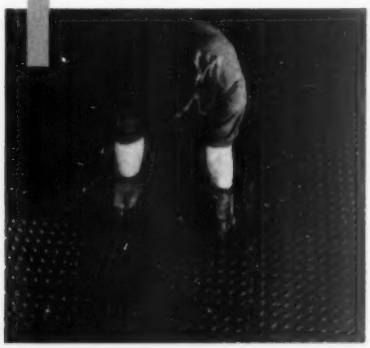
4-WAY is popular as a safety flooring in plants and for product use where fire hazards are a problem. Resists intense heat and shock with ease. Eliminates fire risk, reduces insurance costs.

attractive

Popular demand for 4-WAY also results from its attractive appearance, eye-pleasing design. Pattern is uniform in all directions, pieces are easily matched. Looks good even after years of service.

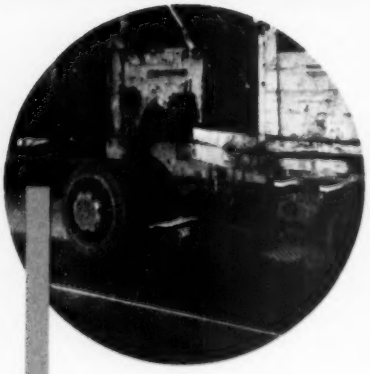
economical

You'll be floored by 4-WAY's low cost! Initial cost is competitive with other flooring materials, installation cost may be less. Repair cost is practically eliminated. Maintenance is trouble-free.



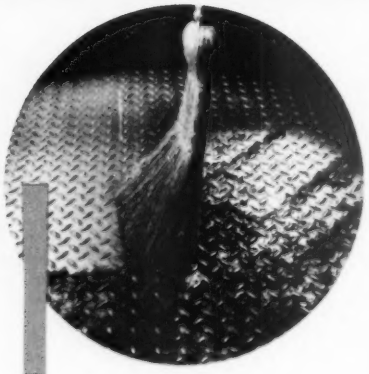
safe

Specially designed raise-lug pattern provides dependable all-weather traction for men and vehicles. STOPS and starts are made quickly, safely—*before* accidents get a foothold.



strong

Rough abuse and heavy loads are taken in stride by this tough, tried and proved steel plate. Made of finest rolled open hearth steel. Withstands great stresses.



cleans easily

Where cleanliness and sanitation are prime factors of importance, 4-WAY provides sanitary flooring with no dirt-catchers. Liquids drain away freely, are not absorbed. (Chemical resistant.) Won't splinter, chip or crack.

there's a 4-WAY safety plate size and pattern

TO FIT YOUR NEEDS

Can be . . . Flame Cut • Sheared • Sawed • Drilled and Punched • Welded • Formed • Spot Welded

Goes down fast and flat, fits snug with a minimum of preparation. You have a safe floor surface ready for instant use.

Easy to fabricate and maintain—with the strength found only in steel. These and other advantages make 4-WAY the outstanding choice of industry. See how safety pays off when you use Inland 4-WAY safety plate.

LARGE PATTERN
recommended for floors that must withstand tough abuse and heavy loads

MEDIUM PATTERN
the most popular and most versatile pattern for use in your plant or on your product

SMALL PATTERN
for applications requiring weight reduction or severe forming

(One-half actual size)

easy to fabricate

4-WAY can be fabricated by any of the conventional processes used on carbon steel plates. On-the-spot cutting, drilling or burning is readily accomplished with standard equipment.

MAIL *for more information*

CLIP THIS COUPON

INLAND STEEL COMPANY
38 South Dearborn Street
Chicago 3, Illinois

Gentlemen:

Please furnish me with the following information on 4-WAY safety plate:

☐ Catalog ☐ Availability and ordering information

Name _____ Title _____

Firm _____

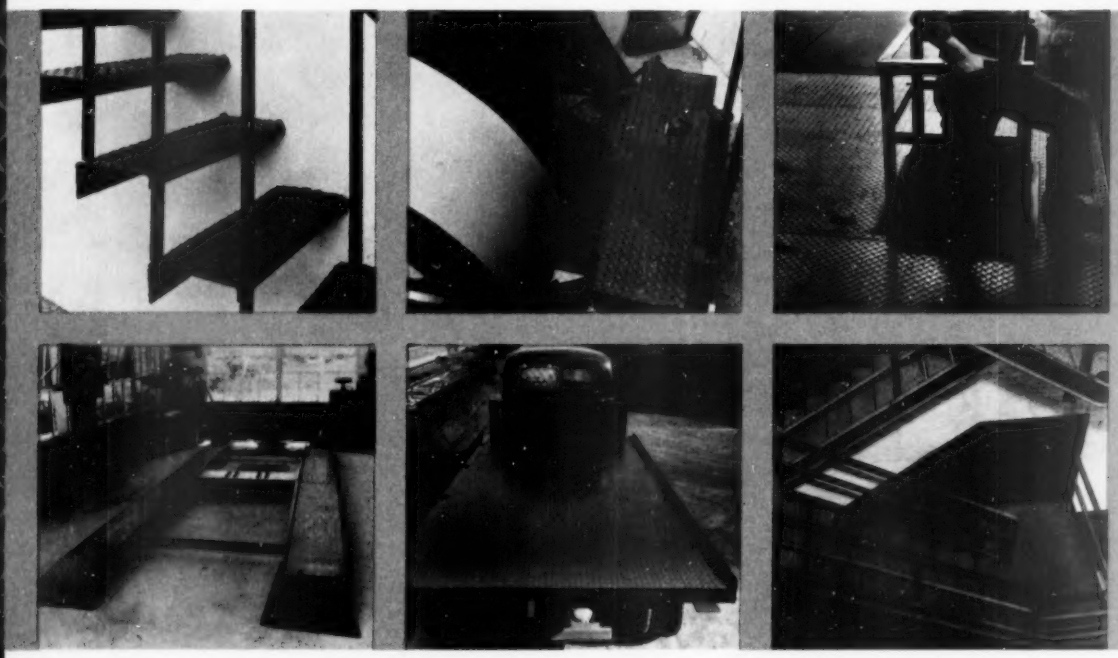
Address _____

City _____ Zone _____ State _____

A B C D E F G H I J K L M

Inland 4-WAY® safety plate

PROVED
IN USE



Actual use under the most trying conditions has proved Inland 4-WAY the versatile answer to flooring problems. Rugged, long lasting, it combines safety, strength, fire resistance and ease of maintenance all rolled into one. See for yourself how 4-WAY can safeguard you best and save you more. Send for the catalog that tells the complete 4-WAY story.

Stocked by leading steel warehouses throughout the U.S.A. and Canada

INLAND

INLAND STEEL COMPANY

38 South Dearborn Street • Chicago 3, Illinois

Sales Offices: *Chicago, Milwaukee, St. Paul, Davenport, Kansas City, St. Louis, Indianapolis, Detroit, New York*

A BUILDING TREND-SETTER

For fireproof, permanent, lightweight modern, speedy construction . . . it's Ruberoid Corrugated Asbestos Sheets!

Forget sheathing . . . specify lighter foundations and footings . . . speed construction . . . save material, save time, save money . . . and end maintenance-expense with Ruberoid Corrugated Asbestos Sheets. These rugged sheets, in pre-cut lengths from 6 inches to 12 feet, are relatively light, easy-to-handle, quick to apply.

Learn why this old and tested, yet new-as-tomorrow building material is setting the trend in today's building methods. See A.I.A. File No. 12-F, or send for Ruberoid's 32-page Corrugated Asbestos specification booklet, showing application methods in detail.

Mail coupon today

The **RUBEROID** Co.

ASPHALT AND ASBESTOS BUILDING MATERIALS

The RUBEROID Co.
500 FIFTH AVENUE, NEW YORK 36, N. Y.

Please send me 32-page illustrated booklet on Ruberoid Corrugated Asbestos construction for roofs and sidewalls.

NAME _____

TITLE _____

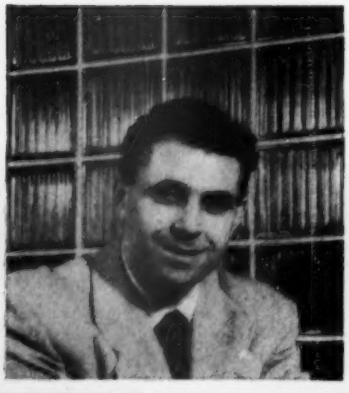
COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

FM-5

"We really saved money with *and our tenants*



says **R. L. Kaufman,** *Asst. to President*
J. B. Kaufman Realty Company

This outstanding window modernization job was done by W. J. Soukop, Inc., Bayside, L. I., N. Y.

these PC Glass Blocks, *liked them from the start"*

• It was an old, old story at the Kaufman Building in Long Island City, N. Y. The steel sash bulged out of line as much as 4 inches. Ventilators warped and they were often impossible to open or close. The thousands of small glass panes just *couldn't* be kept clean except at prohibitive cost.

Heat loss was high in the winter, the interiors were blazing hot in the summer and the twisted sash made the building look unsightly.

All that grief is gone, now. In Mr. Kaufman's words: "With these PC Glass Blocks, we've eliminated all our window troubles. Glass Blocks are no more expensive than steel sash because maintenance costs are so low. We have to clean them only twice a year. Window painting costs are sharply reduced. And in addition to that, we'll save approximately 15% on our heating and air conditioning costs. In the long run, we'll be money ahead. The building itself looks 100% better."

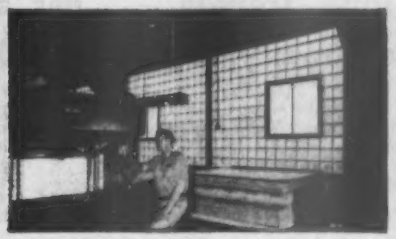
For more information on how you can have better daylighting, lower heating, air conditioning and maintenance costs, and a better-looking building in the bargain, return the coupon.

Pittsburgh Corning Corporation

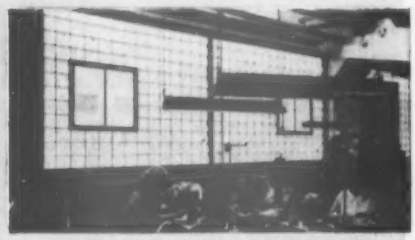
PITTSBURGH 22, PA.

READ WHAT THE KAUFMAN BUILDING TENANTS SAY ABOUT PC GLASS BLOCKS:

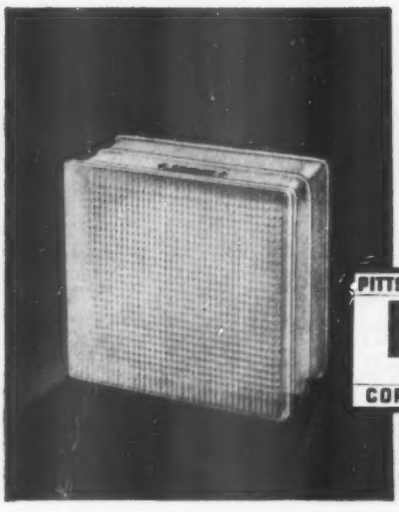
MANUFACTURER: "The PC Glass Blocks give excellent light in our plant area. In the machine shop, men have critical visual tasks. These glass blocks make their jobs easier."—George A. Loeb, Vice-President, General Register Corp., world's largest manufacturer of admission control systems.



LITHOGRAPHER: "We have nothing but praise for these PC Glass Blocks. There are no more drafts, no more dirt. The change in appearance is terrific."—George C. Kindred, President, Kindred-MacLean Co., Inc., one of New York City's largest lithographers.



KNITTING MILL: "We liked the PC Glass Blocks right from the start. They look fine, and the improved natural lighting saves a lot of money on our electricity bills."—Barnett Levitt, Secretary, Gropper Knitting Mills, Inc.



Here's what you get with PC Glass Blocks

● **STYLES FOR EVERY NEED**—decorative or functional patterns, latter for sunlighted or northern elevations, above or below eye level.

● **SOFT-LITE* EDGE**—opal glass insert at edge of block cuts edge glare, creates soft, uniformly lighted panel.

● **DIFFUSING SCREEN**—divides block into 2 halves, raises insulation value, diffuses light, cuts glare. Available in certain styles.

● **"CLEAN-EASY" FACE FINISH**—special coating protects block face from mortar and dirt. Gives neater installation. Available in certain styles.

● **SAVES MONEY**—eliminates sash painting, puttying and replacement. High insulating value cuts heating and air conditioning costs.

*T.M. Reg. applied for.

Pittsburgh Corning Corporation
Dept. N-53, Pittsburgh 22, Pa.

Please send me a FREE copy of your booklet, "PC Glass Blocks—The Mark of a Modern Building."

☐ Send engineer to discuss specific problem. ☐ Advise nearest source of supply.

NAME ..... TITLE .....

FIRM .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

You name it, STANDARD'S got

Save time, trouble . . . get all these maintenance supplies from your Standard Oil Industrial Salesman

Standard Liquid Wax — recommended for linoleum, asphalt tile, rubber tile, composition, and finished hardwood floors. Easily applied with mop or pad. No buffing. Gloss lasts for weeks . . . and is scratch-resistant under heaviest traffic.

Standard Penetrating Sealer — Heavy Duty. For any floor that takes a beating — wood, cork, composition, masonite-type, concrete. Seals pores with hard, waterproof gums and oils. Gives a non-glossy, slip-retarding surface that won't show traffic lanes.

Standard 2, 4-D Weed Killer — Amine Concentrate (to be mixed with water). A selective weed killer for sure control of broad-leafed weeds such as dandelions and plantains. Scientifically developed and proved in field use.

Standard Crabgrass Spray—completely destroys Crabgrass and prevents seeding. Effective on any size area. Will not harm desirable grasses. Gives fast, long-term control.

Standard carries a *complete line* of high quality maintenance products, including:

Standard Insect Spray with DDT — powerful, residual killer, potent against crawling insects inside buildings.

Standard 25% DDT Concentrate, an emulsified DDT insecticide for outdoor fly and mosquito control.

Standard Roach and Ant Spray for hard-to-kill crawling insects.

Standard Dormant Spray Oil No. 1 (Dendrol) for elimination of overwintering forms of pests on trees.

Standard Summer Emulsion Concentrate (Verdol), safest summer tree spray oil available.

Standard Elm Spray — destroys the insect carriers of elm phloem necrosis and Dutch elm disease.

Standard Plant Spray — kills red spiders, aphids, leaf hoppers, mites, and other insect pests of trees and ornamental shrubs and plants.

Standard Garden Dust — quickly controls many garden pests and diseases.

Standard Brush Killer — effective against oak, hickory, elm, poison ivy and other unwanted brushy plants.

Standard Liquid Gloss — cleans and polishes furniture and woodwork in one operation.

Standard Super Finish — gives high gloss finish to gym and other wood floors.

it, for easier plant upkeep!

See your S.O. Industrial Salesman! when you need products for floor, tree, lawn care . . . insect and weed control

That's right! The same man who brings you cutting and lubricating oils now handles a complete line of maintenance products for your convenience. Order "the works" from him, and keep your plant performing and looking its best, inside and out, with these fine quality products by Standard.

Remember: For easier, more efficient plant maintenance, the man to see is your familiar Standard Oil Industrial Salesman. He's ready to be of service anytime. Just give him a call. Remember, too, fast delivery service from hundreds of well-stocked warehouses all over the Midwest.

STANDARD

STANDARD OIL COMPANY (INDIANA)

New technical center

INSULATED PANELS of U·S·S 17 (Type 430) Stainless Steel and face brick make an eye-appealing combination on this elevation of the National Malleable and Steel Castings Company Technical Center. Glass block and corrugated glass are also used on the building.

Technical Center, National Malleable and Steel Castings Company, Cleveland, Ohio.

Architects and Engineers: Dalton-Dalton Associates, Cleveland.

General Contractor: The Leonard H. Krill Company, Inc., Cleveland.

Panel Fabrication and Erection: The H. H. Robertson Company, Pittsburgh.

Bill of Material

STAINLESS STEEL PANELS AND FLASHINGS

1. 1730 sq. ft. insulated "Q-Panels" (#3 Section), 20 gauge, Type 430, #2D Special Finish, and #8 Section, 18 gauge, metal coated steel, plus 1½" fiber glass insulation.
2. 7449 sq. ft. insulated Wall Panels, Type 430, #2D Special Finish, and 1" tectum insulation.
3. 32 Special Formed Mitered Corners —20 gauge, Type 430, #2D Special Finish.
4. 2 Special Formed Scuppers, 20 gauge Stainless Steel.
5. Approximately 3002 lin. ft. various formed up flashings—20 gauge, Type 430 Stainless Steel.
6. Approximately 750 pieces standard notched corrugated closers, 20 gauge, Type 430 Stainless Steel.

STAINLESS STEEL FASTENERS

1. ⅜" x 3" RHSS Bolts (Fasten Panels to Girts).
2. ⅜" x 1½" RHSS BOLTS.
3. #12 x ¾" RHSS Wood Screws.

takes advantage of insulated panels of U·S·S 17 Stainless Steel

IF you're looking for striking beauty that time and weather won't affect, insulated panels of U·S·S 17 (Type 430) Stainless Steel are the logical choice for your new building, no matter what its function may be.

For example, National Malleable and Steel Castings Company, Cleveland, Ohio, is constructing its new office and laboratory building with Stainless Steel panels used in combination with face brick, glass block and heat-absorbing corrugated glass.

Approximately 9,000 square feet of the wall surface of the new National Technical Center is Stainless Steel. In addition to their striking appearance, these panels will yield many other benefits, both during erection and after occupancy.

Since the structure is completely air-conditioned, the low coefficient of thermal transmission ("U" factor) of these insulated panels is extremely important. Erection took place in midwinter, without regard to weather conditions. Initial cost is well in line with comparable materials and its low maintenance cost will save money throughout the long life of the building.

For full information on this modern material of construction, send for our new book containing the latest data on construction with panels of U·S·S 17 Stainless Steel.

EVEN SEVERE WINTER WEATHER didn't halt erection of Stainless Steel panels on this laboratory and office building. Fast erection without regard to weather conditions is only one of the advantages of this type of construction.

United States Steel Corporation
525 William Penn Place, Room 2812-T
Pittsburgh 30, Pa.

- ☐ Please send me your new booklet on U·S·S 17 Stainless Steel for industrial buildings.
- ☐ Please arrange to have fabricators of Stainless Steel wall panels send me literature on their particular type of construction.

Name ..... Title .....

Address .....

City ..... State .....

United States Steel produces only the Stainless Steel sheet and strip from which panels of this type are made; the panels themselves are fabricated by a number of our customers.

U·S·S STAINLESS STEEL

USS

SHEETS · STRIP · PLATES · BARS · BILLETS
PIPE · TUBES · WIRE · SPECIAL SECTIONS

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

Need help with your problems?

IMPORTANT NEW Free CATALOGS

. . . they're the cream of the crop in the building field—Tell us which ones you want. Just circle the catalog numbers on the reader's service postcard next to the inside back cover. We'll ask the manufacturers to forward them directly to you.

BUILDINGS AND GROUNDS

1 Composition Board
In this 12-page catalog (No. 5202) you learn how you can improve production, maintenance, and materials handling with hardboard. Application chart. Masonite Corp.

2 Treated Lumber
Catalog about pressure-treated lumber tells what it can do, where you can use it. 24 pages. American Lumber & Treating Co.

3 Incinerators
Specs and dimension details for each of several models in these two bulletins. Capacity tables, construction features. 14 pages. Brule Incinerators.

4 Standard Buildings
Shows standard steel buildings, and how you can build any multiple of standard widths and lengths. Structural tables. 24 pages. Steelcraft Mfg. Co.

5 Standard Buildings
Describes advantages of standardized units, suggests applications. Architectural drawings, specs. 24 pages. Form No. K-90. Truscon Steel Co.

6 Structural Panels
Tells how to use translucent panels as walls and skylighting, for toilet and shower stalls. Specs and engineering data 12 pages. Resolite Corp.

7 Structural Panels
Illustrates applications for translucent fibrous glass panels. Physical properties and installation hints. 4 pages. Catalog No. 952. Alsynite Co. of America.

8 Structural Panels
Metal building panels are subject of this 40-page catalog (No. BP-1). Architectural data. Detroit Steel Products Co.

9 Metal Walls
Here's a 48-pager on movable metal walls. Illustrates available structural sections, tells how to install. Catalog No. 35. Mills Co.

10 Glass Blocks
Gives insulating and light transmitting values for the product. Engineering and installation data, plus complete specifications. Catalog No. G81700. Pittsburgh-Corning Corp.

11 Peg Board
Features a peg board material for walls that permits quick hanging of shelves or tools. Specs, accessories, suggestions for many other plant uses. 4 pages. B. B. Butler Mfg. Co.

12 Industrial Tile
You learn where and how to use a greaseproof industrial tile in this 4-pager. Color, maintenance information. Uvalde Rock Asphalt Co.

13 Asbestos Sheets
How corrugated asbestos sheets are made and how you can use them in your plant. Selection information, application tips. 32 pages. The Ruberoid Co.

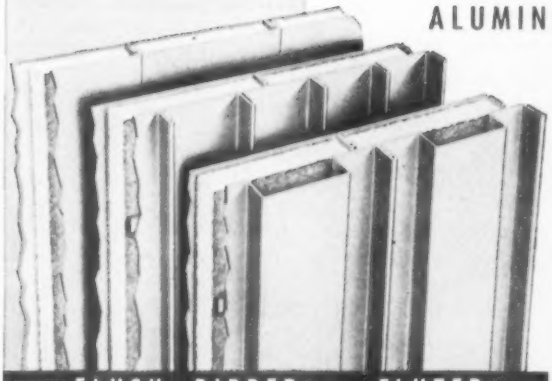
14 Insulation
Tells how to select fibrous glass insulation. Architectural details, installation tips. 36 pages. Catalog No. G0410. Pittsburgh-Corning Corp.

OTHER SECTIONS:
Plant Engineering Problems . . Page 168
Plant Operating Problems 172
Plant Services . . . . . Page B-108
Electrical Distribution B-266
Materials Handling B-324

INSULATED METAL WALLS

for INDUSTRIAL and COMMERCIAL BUILDINGS

ALUMINUM, STAINLESS or GALVANIZED STEEL



FLUSH, RIBBED, or FLUTED
Over-all "U" Factor of Various Types is Equivalent to or Better than Conventional 16" Masonry Wall

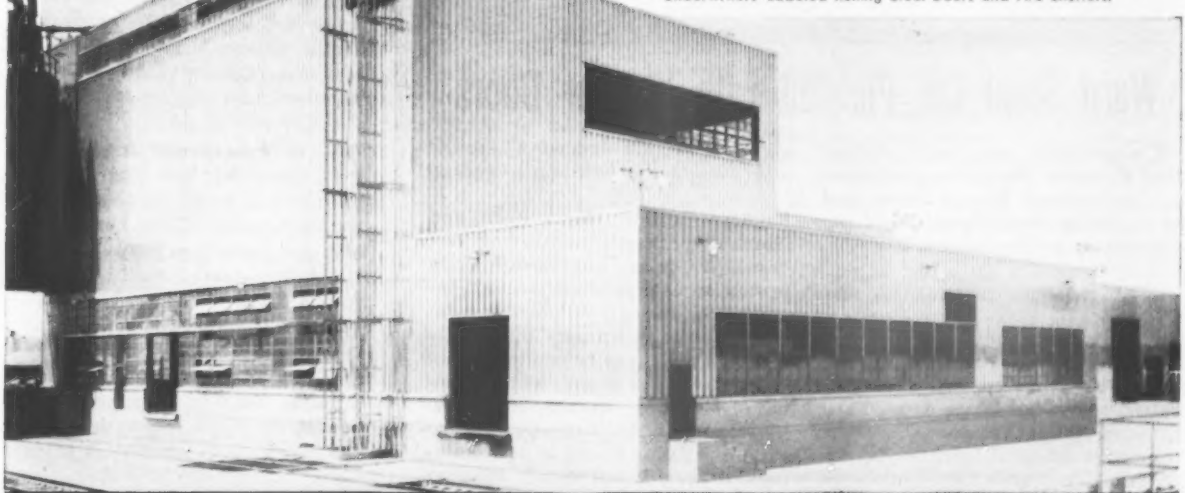
As evidence of the trend to Insulated Metal Walls in modern construction, the following statements are presented: 520,000 sq. ft. of Mahon Insulated Metal Walls with aluminum exterior plates were employed in the construction of three complete new industrial plants built by one manufacturer in three widely separated localities. More than 66,000 sq. ft. of the same type of wall was employed in the construction of two complete new plants for another manufacturer. In the five new plants referred to, there were seventeen separate buildings of various industrial types. The fact that additional plants were subsequently built by both of these manufacturers, employing the same identical wall construction in each case, indicates the degree of enthusiasm among architects and owners for the striking appearance of the finished buildings, as well as the time and labor-saving advantages of this type of permanent, firesafe construction. Mahon "Field Constructed" Insulated Metal Walls can be erected up to fifty feet in height without horizontal joints—a feature of Mahon walls which is particularly desirable in powerhouses and other buildings where high expanses of unbroken wall surface are common. For complete information and specifications, see Sweet's Files or write for Catalog No. B-53-B.

THE R. C. MAHON COMPANY

Detroit 34 ,Mich. • Chicago 4, Ill. • Representatives in All Principal Cities

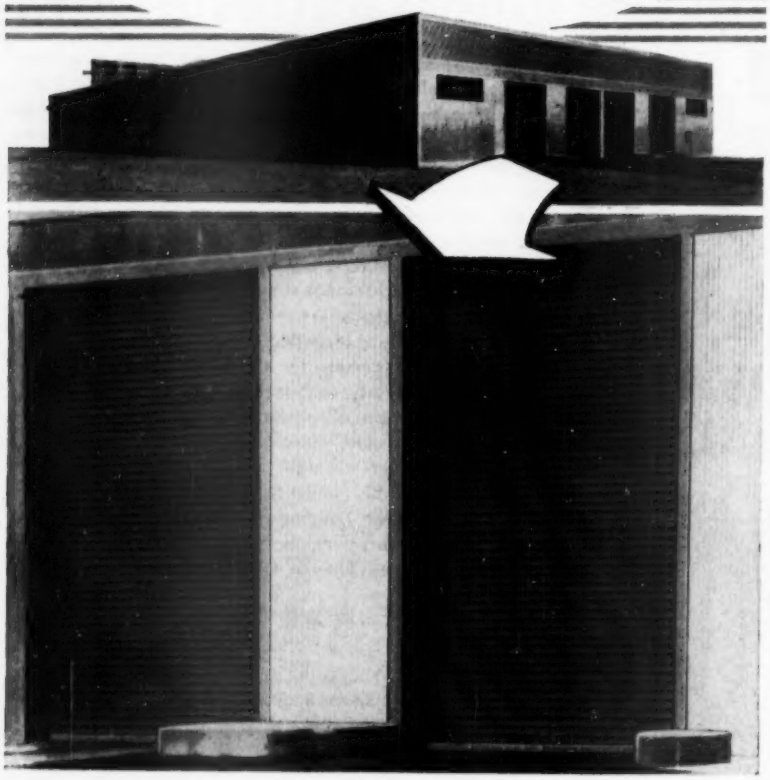
Manufacturers of Insulated Metal Walls; Steel Deck for Roofs, Partitions and Permanent Concrete Floor Forms; Rolling Steel Doors, Grilles, and Underwriters' Labeled Rolling Steel Doors and Fire Shutters.

Powerhouse at the New Lincoln-Mercury Plant, Wayne, Michigan. One of the seventeen separate buildings included in the five plants referred to in this adv.



MAHON

KINNEAR
Steel Rolling Doors
increase efficiency in another modern building



Ward Steel Co. Pleased with Kinnear Doors

"We certainly are very pleased that Kinnear Doors were selected . . . we operate five of them, and at all times have experienced the utmost of performance."

Mr. J. A. Parsons, Vice President
Ward Steel Co., Cambridge, Mass.

— And in thousands of other buildings, old and new, Kinnear Rolling Doors have proved that they give *better* service at *lower* cost. Their efficient *coiling upward action* and protective all-metal interlocking slat construction permit maximum use of all space around doorways — *inside and outside* the building — always.

Kinnear Rolling Doors open and close with smooth, time-saving ease *year after year*. They assure extra protection against wind, weather, intrusion, and fire. Available for manual or motor operation. Electrically operated doors can be equipped with control switches at any desired number of locations. Kinnear Steel Rolling Doors are built in any size, for easy installation in old or new buildings. *Write for full details today.*

Saving Ways in Doorways
KINNEAR ROLLING DOORS

The KINNEAR Mfg. Co.
FACTORIES:
1540-60 Fields Avenue, Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif.
Offices And Agents In All Principal Cities

Free NEW CATALOGS

Begins on page B-40

15 Insulation Board
Describes panel, tile, plank, and sheathing insulation. Details on installation, design data. 16 pages. National Gypsum Co.

16 Roofs
This 4-page bulletin gives features and describes applications on a fibrous glass roof shield for roof maintenance. Step-by-step installation instructions are included. Addex Corp.

17 Walls & Roofs
Stainless steel building panels get the spotlight in this 18-pager. Architectural, erection data. Tells where to use the metal in your building. Catalog No. ADV-19014. U. S. Steel Corp.

18 Decking
In this 8-page bulletin you'll find all you need to know to select and use maker's decking. Performance and installation information. Section on accessories. Airtherm Mfg. Co.

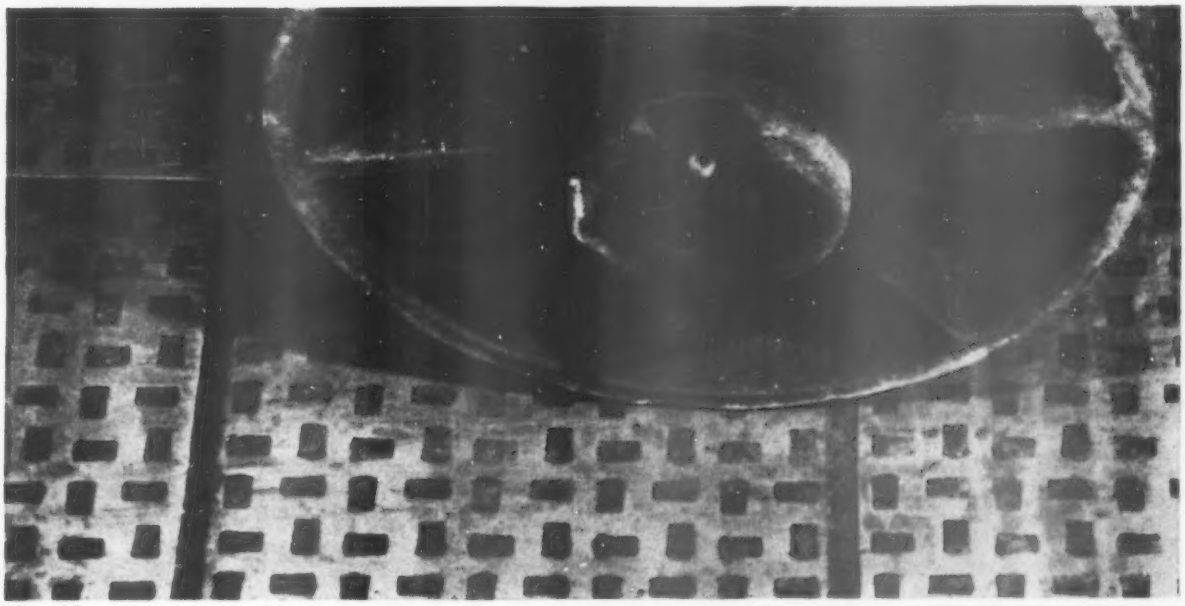
19 Roof Decks
A 4-page folder describes properties and uses for steel roof decks. Specs, load-carrying tables, estimating data. Inland Steel Products Co.

20 Weatherproof Asphalt
Describes how special formulation is resistant to sun, salt air, and fumes. Tells how to select and install. 4 pages. Catalog No. B-13. American Bitumuls & Asphalt Co.

21 Roofs
A group of bulletins describing features of maker's steel roof deck, gypsum roof deck, and sheetrock roof. Technical infor-

To get these catalogs, circle number on reader's service postcard next to back cover.

Now Acme Steel Floor Plate Makes Floors Last Longer



Quick-to-install, skid-resistant heavy-duty Floor Plate saves money

Here, at last, is the commercially proven product that answers your industrial flooring problems. Acme Steel engineers have designed a steel floor plate that combines the skid-resistant characteristics of concrete with the durability of steel for floors subject to heavy traffic and abusive wear.

Each foot-square plate is anchored in concrete with one hundred prongs and flanged edges. Plate cannot work loose, weave or rattle. A unique grid, exclusive with Acme Steel, gives smooth, even surface.

And Acme Steel Floor Plate saves you money in four ways:

1. **Installation time is cut. (It takes less time to install than it does to trowel surface of an ordinary concrete floor.)**
2. **Floor lasts longer. (The wear on one floor after three years of constant wear was less than .0025 inch in a recent test.)**
3. **Waste is eliminated during installation. (Individual plates can be installed around posts and machinery without cutting.)**
4. **Under-floor repairs are quicker, cheaper. (Only plates on area over pipes or conduits to be repaired are removed. Plates over adjoining areas remain in place protecting concrete from chipping, cracking.)**

Ask your Acme Steel representative about your industrial flooring problems, or write Dept. FMM53, Acme Steel Company, 2849 Archer Avenue, Chicago 8, Ill.

READ WHAT USERS SAY!

"Show no appreciable signs of the heavy traffic they have carried." *Seabrook Farms Co., Bridgeton, N. J.*

"Best answer to correcting our plant floor and aisle problems." *Morris Paper Mills, Morris, Illinois*

"Only floor steel that has worked out satisfactorily in our experience." *Christ Lundegaard, Cement Contractor, Chicago*

ACME STEEL

ACME STEEL COMPANY, Dept. FMM53
2849 Archer Avenue, Chicago 8, Illinois

Gentlemen: Please send me your free, new illustrated ACME STEEL Floor Plate folder.

Name_____

Company_____

Address_____

City_____ State_____

Give fire half a chance and it will over-run you like a swarm of ants.

You must stamp it out anywhere it shows itself. In the paint locker, power plant, garage.

That calls for a battery of strategically placed KIDDE Portable Fire Extinguishers.

Get the ants out of your plants.
Call your KIDDE dealer today.

Kidde

Walter Kidde & Company, Inc.,

532 Main Street, Belleville 9, N. J.

Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

Free NEW CATALOGS

Begins on page B-40

mation, application recommendations. 24 pages in all. U. S. Gypsum.

22 Insulated Roofs
"The design of insulated roofs" is subject and title of this 36-pager. Describes maker's products, tells how to use each. Owens-Corning Fiberglas Corp.

23 Built-Up Roofs
In this 126-page catalog you'll find selection and application information on built-up roofs and flashings. Architectural and installation details. The Ruberoid Co.

24 Floors
"Over the rough spots" is title of this 48-pager on floor maintenance products. Tells how to watch for danger areas, what to do about them. Stonhard Co.

25 Safety Walk
Folder suggests applications, gives specs on a wet or dry surfacing material. Illustrates representative installations. Form No. W-SJK. Minnesota Mining & Mfg. Co.

26 Safety Grating
Describes how you can use maker's grating in your plant. Construction details, installation information. 8 pages. Grip-Strut Div., The Globe Co.

27 Walkways, Loading Racks
Several different types illustrated and described in this 42-page catalog (No. 54). Application section, engineering data, tells how to erect. Black, Sivalls & Bryson, Inc.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

Need a Low Cost Permanent Building

QUICKLY?

. . . include
STEELCRAFT
STEEL Craft
in your plans!
Steelcraft recently solved a building problem for one of the nation's largest textile manufacturers. Steelcraft engineers recommended a 200' x 300' rigid frame truss building with 50' clear spans. The finished square foot cost including foundation and erection was much lower than a specially fabricated building of similar design.
Flexibility of design and low cost are assured by Steelcraft's fully integrated manufacturing operation with continuous flow of standard parts, doors, windows from one source . . . delivery timed to meet your construction schedule.
Write today for complete information on Steelcraft Steel Buildings—Use Coupon Below
STEELCRAFT
MANUFACTURING CO.
ROSSMOYNE, OHIO (In Greater Cincinnati)
RIGID FRAME TYPE
TRUSS TYPE
SPECIAL TYPE

The Steelcraft Manufacturing Co., Dept. PMM-553
9017 Blue Ash Road, Rossmoyne, Ohio

( ) Send engineer to survey my building requirements.

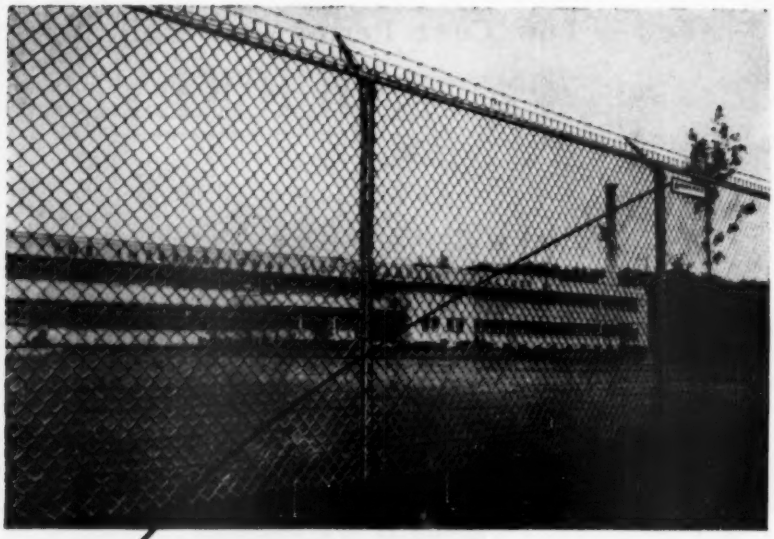
( ) Send me information on complete line of Steelcraft Metal Buildings.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____



THE LINE BETWEEN
Production AND
destruction OFTEN
CARRIES THIS FAMOUS SIGN!

ANCHOR FENCE

Anchor Fence provides one of the surest ways to guard your production against destruction by thieves, vandals and agitators.

All of your productive factors—your plant, equipment, vehicles, materials and employees—are safe within the area guarded by dependable Anchor Fence.

At the same time, Anchor Fence smoothes the flow of vehicular traffic, the loading and unloading inside the yard.

But Anchor Fence keeps those who would destroy your profits outside where they belong.

But be sure to look for the orange-and-black name-plate that identifies all genuine Anchor Fence. For that name-plate is your assurance of the finest in industrial fencing.

Write for Additional Information

Ask for Anchor's fact-packed *Industrial Fence Catalog*. Or, if you prefer, invite one of our thoroughly informed engineers to submit recommendations — without any obligation, of course. Address: ANCHOR POST PRODUCTS, INC., 6620 Eastern Avenue, Baltimore 24, Maryland.

Anchor Fence

Division of ANCHOR POST PRODUCTS, *Inc.*

Free NEW CATALOGS

Begins on page B-40

28 Floor Plate
Tells where to use rolled steel squares on old or new floors. Describes maintenance and installation. Acme Steel Co.

29 Flooring
Information on open steel flooring, concrete armoring, and safety steps in this 1-pager. Selection charts, information on how to use. Tri-Lok Co.

30 Abrasive Floors
In catalog No. 1935 you'll find applications and features of maker's abrasive floor materials. Specs, sizes, and color data. 12 pages. Norton Co.

31 Floors
Outlines selection, application, and installation of maker's cement floors. Installation photographs are included. 8 pages. Kalman Floor Co.

32 Floors
A 4-page folder gives features and suggests applications on a line of heavy-duty floors. Tells how to recondition old floors. Properties charts. Nukem Products Corp.

33 Floor, Wall Maintenance
Complete line of floor maintenance materials gets the spotlight in this 12-pager. Tells where and how to use each. A. C. Horn Co., Inc.

34 Floor Resurfacer
Outlines 3-step procedure in resurfacing with maker's products. Application tips, specs, product descriptions. The Monroe Co., Inc.

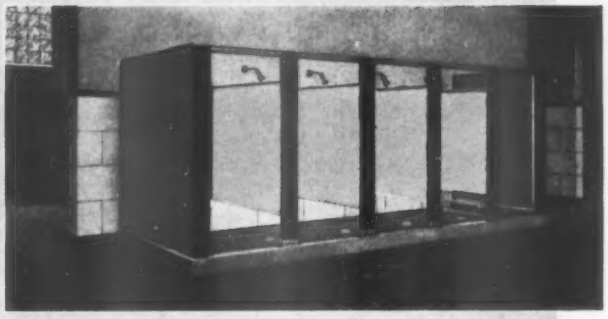
Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

Sanymetal*

*Trade Mark Reg. U. S. Pat. Off.

can help you reduce non-productive time costs!



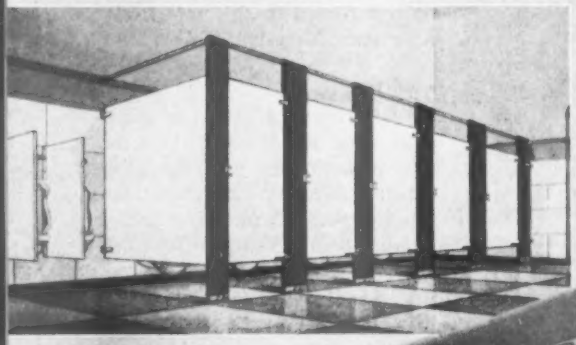
Sanymetal Academy Flush Type Shower Stalls provide suitable shower facilities for all types of industrial plant shower installations. This is just one of several types of Sanymetal Shower Stalls, all of which are available in Vitreous Porcelain on Steel, the ageless and fadeless material, or "Tenac"—synthetic enamel baked on over galvanized, Bonderized* Steel. (*Treated with "Bonderite", a product of the Parker Rust Proof Co.)

● One place to reduce non-productive time costs is at the service facilities level. Dirty, depressing, unsanitary restroom and shower facilities slow down production, tend to increase scrap, cause irritation and resentment and discomfort among employees. Time wasted loafing on account of inadequate and remotely located restrooms can be lessened considerably. This is no time to skimp on rest and shower room facilities.

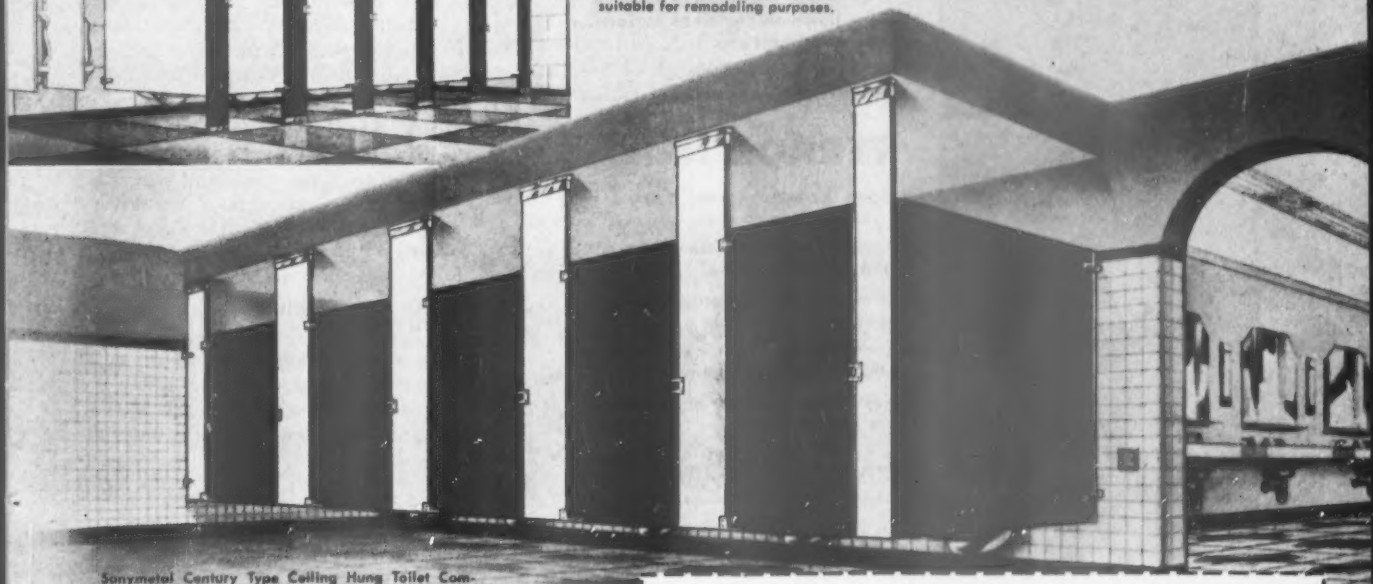
An installation of Sanymetal Toilet Compartments fosters appreciation of rest and shower room facilities and encourages orderliness and cleanliness and *wins the cooperation of employees in reducing the day-to-day maintenance cost of such facilities to an all-time low.* Sanymetal offers several different types of toilet compartments and shower stalls for different types of industrial buildings. These different types are available in a range of materials and finishes suitable for industrial installations. Sanymetal's Vitreous Porcelain on Steel Toilet Compartments and Shower Stalls are fabricated of this ageless and fadeless glass-hard, stainless material that always looks new, does not absorb odors, is moisture and rustproof and resists the corroding nature of ordinary acids. There is no other material that equals it!

Sanymetal Toilet Compartments and Shower Stalls embody the results of over 39 years of specialized skill and experience in making over 500,000 toilet compartment and shower stall installations. Write for Catalog No. 90 which offers ideas for reducing non-productive time costs.

THE SANYMETAL PRODUCTS CO., INC.
1707 URBANA ROAD • CLEVELAND 12, OHIO



Sanymetal Academy Flush Type (Overhead Brace) Toilet Compartments are the most popular floor supported type toilet compartments for industrial installations. This type makes a strong, sound, distinctive installation and is suitable for remodeling purposes.



Sanymetal Century Type Ceiling Hung Toilet Compartments are particularly appropriate for industrial restrooms. When combined with wall-type plumbing fixtures the cost of day-to-day maintenance can be reduced to an all-time low because there is nothing to interfere with the floor cleaning procedure.

Write for Catalog No. 90 which offers ideas for reducing non-productive time costs.

THE SANYMETAL PRODUCTS CO., INC.
1707 Urbana Road, Cleveland 12, Ohio

We are interested in ideas for reducing non-productive time costs and day-to-day maintenance costs of restroom and shower room facilities. Please send Catalog No. 90 promptly.

Name _____

Position _____

Company _____

Street _____

City and State _____

Please attach coupon to your business letterhead.

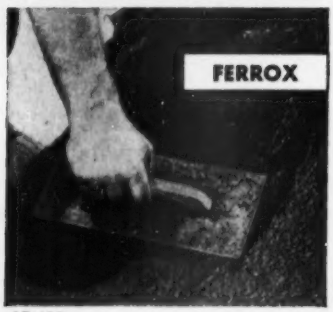
don't slip up on Safety

USE FERA-MAT OR FERROX

Slips are costly . . . and far too frequent. In fact, they cause one in six of all disabling accidents. You don't have to put up with greasy, oily, hazardous floors. The cure is simple . . . and economical. For safety underfoot, use easy-to-apply Fera-Mat or Ferrox floor coverings.

FERA-MAT facts

- Peel it...roll it...and walk on it in safety.
- Comes in 6" x 24" cleats that are ideal for stairs.
- Covers large floor areas quickly... cuts costs.
- Goes down on any clean surface... and stays there.
- Diamond-hard surface, yet easy to clean.



FERROX facts

- Open the can...trowel it on... ...say so-long to slips.
- Perfectly suited for machine areas and uneven surfaces.
- Gives excellent coverage...40 square feet to gallon.
- Really sticks...resists oil, chemicals and weather conditions.
- Costs ⅓ as much as fabric-backed floor coverings.

AB-100

Take your choice of either FERA-MAT or FERROX, depending on your plant conditions. Look into American Abrasive's line of non-slip treads, plates and gratings. *Fact Folder on Safety Floorings contains data on Fera-Mat, Ferrox, Fera-Flow, Fera-lun, Bronzalun, Alumalun. Send for your copy.*

AMERICAN ABRASIVE Safety Floorings

AMERICAN ABRASIVE METALS CO. • IRVINGTON 11, N. J.

Free NEW CATALOGS

Begins on page B-40

35 Floors
Specs and applications in maker's greaseproof floors. Installation information, descriptions of available colors. 4 pages. Bulletin No. 103. Kentile, Inc.

36 Safety Grating
Bulletin No. RR-255 shows where you can use safety floor grating and stair treads. Charts and tables, suggestions on installation. 8 pages. A. O. Smith Corp. Safety Grating Div.

37 Safety Treads
Covers safety treads, thresholds, floor plates, elevator sills and a non-slip floor paint. Applications and installation directions for each in this fact folder. American Abrasive Metals Co.

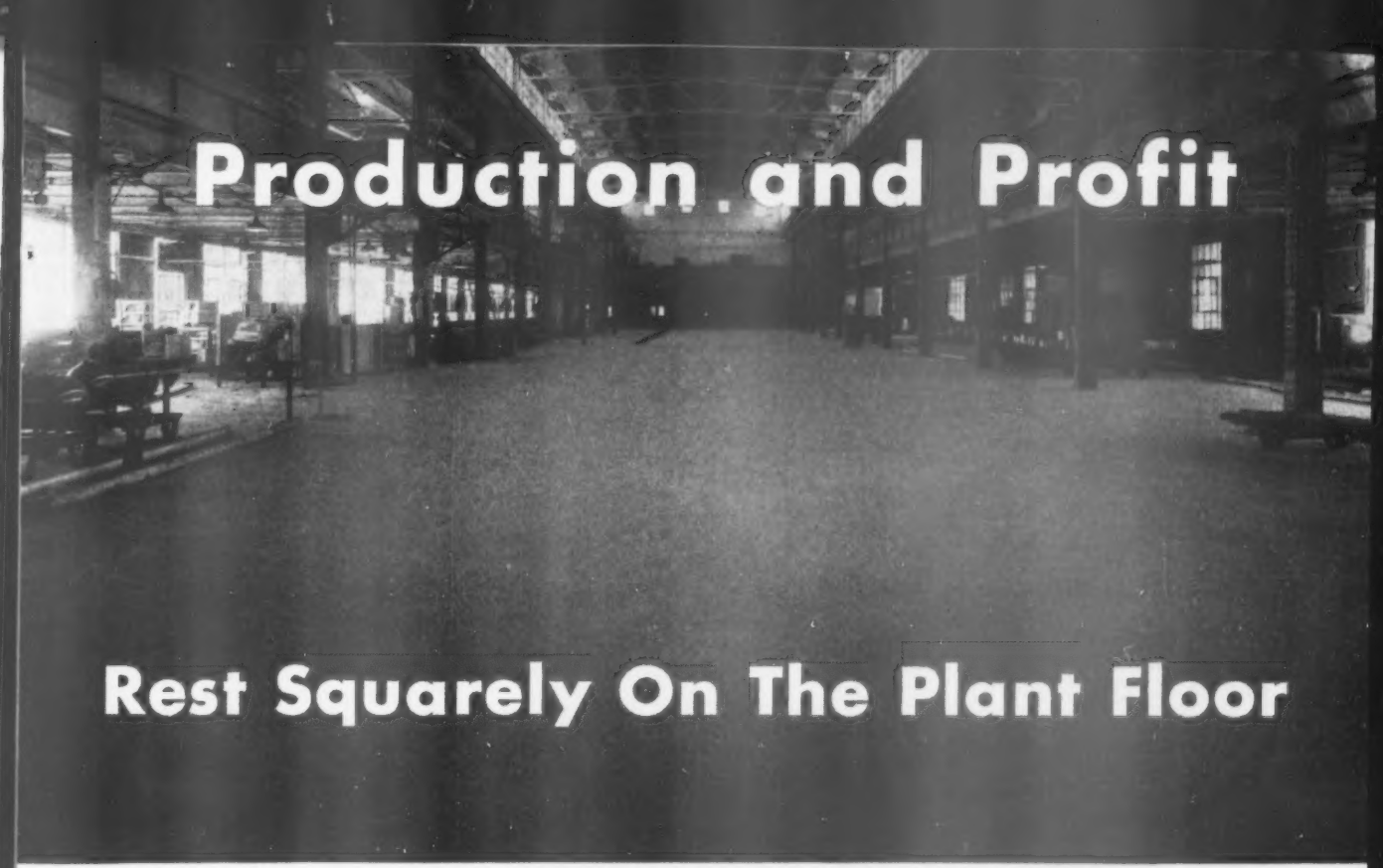
38 Windows
Here's a 24-pager on industrial steel windows. Brings before you the full line—including pivoted, security, and continuous types. Specs. Catalog No. IND-1. Detroit Steel Products Co.

39 Steel Windows
This 10-page collection of bulletins gives specs and sizes for maker's industrial windows. Architectural and dimension details. The Steelcraft Mfg. Co.

40 Scaffolding
Here's a 20-page catalog on standard scaffold sections and how you can assemble them to meet your needs. Typical applications, section on components. Bil-Jax, Inc.

41 Fence
Chain link fence is illustrated and described in this 44-

To get these catalogs, circle number on reader's service postcard next to back cover.



Production and Profit

Rest Squarely On The Plant Floor

View of Masterplate Floor in The Bryant Heater Co. Plant, Indianapolis, Indiana. In excellent condition after 7 years of service. Archt.—Allen and Kelly; Contr.—Wm. P. Jungclaus Co.—both of Indianapolis, Indiana.

MASTERPLATE "Iron-Clad" Concrete Floors

Wear 4-6 Times Longer . . . Help To . . .

Many million square feet of Masterplate floors are in service in America's leading plants helping to maintain a smooth flow of production, reduce maintenance expense and improve plant safety.

Masterplate floors are 4-6 times more wear-resistant than the best plain concrete floor . . . are spark-safe, non-dusting, corrosion-resistant, easy-to-clean, and non-slip. Non-colored and colored.

A Masterplate "iron-clad" concrete floor is the lowest cost floor you can install in your new plant. Your badly worn concrete floors can be made *better* than new by resurfacing with Masterplate.

Full information on Masterplate and "see-for-yourself" demonstration kit supplied upon request . . . without cost or obligation.

Maintain Production

Hold Down Costs

Improve Safety

INSTALLED LIKE THIS . . .

APPLY Masterplate dust-coat to freshly floated concrete.

FLOAT dust-coat on surface of slab by hand or by machine.

TROWEL to desired finish — non-porous, easy-to-clean.

CURE with Master Builders membrane curing compound.

Section of A Masterplate Floor
Note Thickness of Iron-Armored Surface

the MASTER BUILDERS Co.

CLEVELAND 3, OHIO — Subsidiary of American-Marietta Company — TORONTO, ONTARIO

IT'S WHEELING EXPANDED METAL
SOLID STEEL .. PIERCED .. AND S-T-R-E-T-C-H-E-D
Smooth Handling for Small Parts!
The perfect answer to small part handling—baskets made of sturdy, burr-free Wheeling Expanded Metal. They stack and store quickly, easily, neatly. And their open-diamond pattern allows easy cleaning, quick identification.
This is another example of the versatility of Wheeling ExM. Use it for bins, grilles, partitions, wherever you want the strength of solid steel, plus free passage of heat, light, sound and air! Write today for full details!
Easy Stack by Wire & Iron Products, Inc., Detroit
Wheeling
WHEELING CORRUGATING COMPANY
WHEELING, WEST VIRGINIA
ATLANTA BOSTON BUFFALO CHICAGO COLUMBUS DETROIT
KANSAS CITY LOUISVILLE MINNEAPOLIS NEW ORLEANS
NEW YORK PHILADELPHIA RICHMOND ST. LOUIS

Free NEW CATALOGS

Begins on page B-40

page catalog (No. 34). Shows you full line describes erection service. Continental Steel Corp.

42 Fence
Catalog No. 50 suggests where to use maker's armed fence. Construction features described, installation outlined. 8 pages. Atlas Fence Co.

43 Pipe
An asbestos-cement pipe for pressure, sewer, and flue applications is subject of three bulletins. Operating, engineering, and maintenance data. 64 pages in all. Johns-Manville.

44 Mastic Products
A file folder contains data sheets, catalogs, and bulletins on mastic flooring, protective coatings, and floor underlayments. Application charts, specs. The Flintkote Co.

45 Surface Maintenance
A group of bulletins illustrates and describes a line of blacktop surface seals. Selection and application data. Maintenance, Inc.

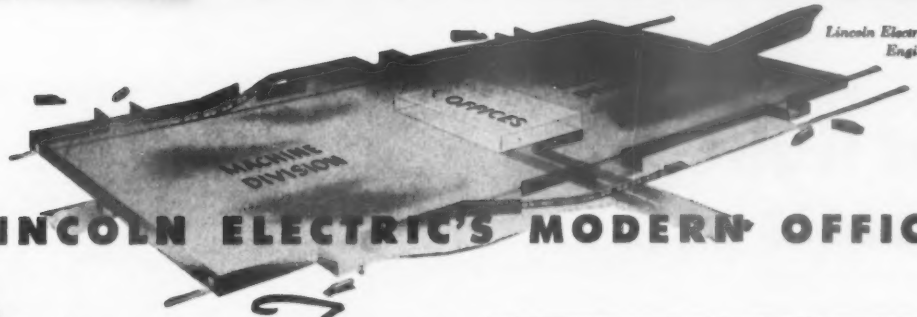
46 Weed Control
Full line of weed control products is described in this catalog. Outlines spray programs to meet special needs. Standard Oil Co.

47 Weed, Grass Killer
Tells how it works and where to use it. You learn how it can save you money. Installation photos. 12 pages. Grasselli Chemicals Dept., E. I. du Pont de Nemours & Co., Inc.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

Lincoln Electric Company, Cleveland, Ohio
Engineers and Builders:
The Austin Company.

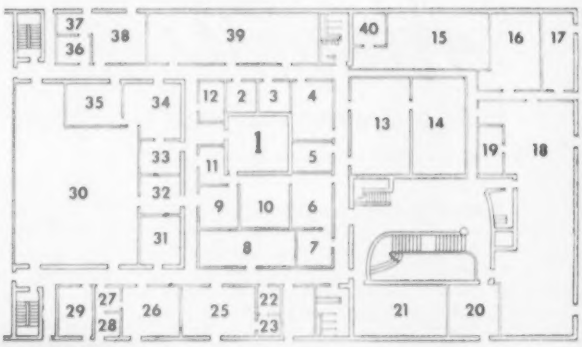


IN LINCOLN ELECTRIC'S MODERN OFFICES

Efficiency First

has been made lasting with

MILLS *Movable* WALLS



Office Layout

Lincoln Electric Company's new 20-acre plant is designed for maximum efficiency in every area, for office as well as production operations. All offices are located in the center of the factory building, with the president's office, *No. 1 in floor plan and pictured at left*, in the exact center of everything, surrounded by key personnel.

Future efficiency is assured by subdividing all office space with Mills Movable Metal Walls. As progress creates changes in space requirements Mills Walls can be moved to fit new layouts—in a matter of hours, with minimum labor, at very low cost and without interrupting normal routine.

Mills Walls combine mobility with distinctively modern and attractive appearance. Insulated and soundproofed, they require no maintenance but occasional washing to keep them looking fresh and bright.

★ ★ ★

Your office space can be made more efficient by *mobilizing* it, through *flexible* interiors formed by Mills Movable Metal Walls. For complete information on this modern, efficient way to subdivide interior space write for this easy-to-read, 48-page booklet, Mills Catalog No. 51.

THE MILLS COMPANY
996 Wayside Road • Cleveland 10, Ohio

cut light costs

with original shatterproof

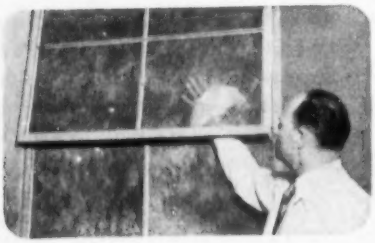
Alsynite®

TRANSLUCENT FIBER GLASS PANELS

NOW YOU can use cost-free daylight wherever you want it in new or existing buildings. Simply replace any part of wall or roof with Alsynite panels. Corrugated Alsynite nests with and installs just like corrugated metal. Gives even, diffused light. Installs for less, cuts light bills and eliminates up-keep because it's shatterproof.

NO MORE BROKEN GLASS

End the broken glass problem permanently by replacing glass in standard sash with shatterproof *Flat Alsynite*. Standard sizes. Easy to install. Alsynite is feather-light, can be sawed and nailed. Seven colors.



ALSYNITE COMPANY OF AMERICA

Dept. FM-2, 4670 DeSoto St., San Diego 9, Cal.

Please send me new full color Alsynite folder plus installation detail sheets.

Name_____

Company_____

Address_____

City_____ State_____

Plants in California and Ohio. Distributors in Principal Cities

Free NEW CATALOGS

Begins on page B-40

48 Plaster, Mortar Mixers
Here's an 18-page collection of folders on several types; illustrations and specs for each. Sections on construction details, standard assemblies. Muller Machinery Co., Inc.

49 Concrete
"Design and control of concrete mixtures" is subject of this 68-pager. Fundamental facts, selection and engineering data. Also describes form-making and finishing. Portland Cement Assn.

50 Coatings
Covers dampproofing, waterproofing, calking, floor treatment, and protective coating materials. Specs and application data. 4 pages. Toch Brothers, Inc.

51 Fabricating Unit
Tells about angle sections for quick fabrication of shelving, bins, racks, scaffolding, and other units. Specs on the standardized sections. Acme Steel Co.

52 Metal Framing
You learn how to build many combinations of framing units from standard sections in this 78-pager. Typical applications, installation sketches. Catalog No. 700. Unistrut Products Co.

53 Stainless Steel
Architectural uses of stainless steels is subject of this 32-page catalog. Lists properties, suggests many plant applications. Charts and tables. Committee of Stainless Steel Producers, Iron & Steel Institute.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

Finest Padlock Protection

inside or outside

Whatever the security job — there's a Master Padlock to fit . . . providing maximum protection at the lowest possible price!

COMBINATION PADLOCKS — Strong, double-wall construction; 3 number dialing; self-locking tumblers; virtually unlimited combinations. Also available with key-control . . . one company-owned key opens all locks.

LAMINATED PADLOCKS — Stronger than a solid steel block; hardened steel shackles; pin-tumbler mechanism; cadmium rust-proofed throughout . . . strongest padlock construction known.

Special service on master-keyed and keyed-alike sets.

Sales Tip — Check the number of years your customers' padlocks have been in use. Old installations are dangerous and should be replaced . . . NOW! Personnel turnover, lost keys, etc. might permit access by unauthorized persons.

FREE!

Catalog of complete Master line. Write for it!

Master Padlocks

POWERFUL PROTECTION • IN PEACE OR WAR

Master Lock Company, Milwaukee 45, Wis.

World's Leading Padlock Manufacturers

Are These Factors in Your...

✓ NEW CONSTRUCTION

✓ INSTALLATION OF NEW MACHINERY

✓ MODERNIZATION OF PRESENT FACILITIES

✓ ON-SCHEDULE COMPLETION

F. H. McGRAW & COMPANY stands ready to serve you in any phase of your contemplated construction program. This modern, progressive construction company has completed **on schedule** over $800,000,000 worth of industrial and heavy construction projects, both large and small, in its 24-year history. Projects have included every major phase of construction from the **design, engineering and construction of complete manufacturing plants** to the **erection of machinery** and **installation of new electrical and piping facilities.** Under the McGraw plan, **construction work need not interfere with present production operations.** If you are planning to expand your manufacturing facilities, call on McGraw experience for good construction... greater production. A letter or telephone call to our closest office will bring the services of an experienced McGraw construction engineer. Call today.

F. H. McGRAW AND COMPANY

Engineers and Constructors

780 WINDSOR STREET, HARTFORD
NEW YORK • PITTSBURGH • CHICAGO
F. H. McGRAW COMPANY, LTD., MONTREAL, CANADA

Nearly Two Acres of MFMA

NORTHERN HARD MAPLE

New N. Kansas City Building, NATIONAL BELLAS HESS, INC.

ALL MFMA Grades are Good Grades

MAPLE FLOORING MANUFACTURERS ASSOCIATION
Suite 571, Pure Oil Building
35 E. Wacker Drive
CHICAGO 1, ILLINOIS

This heavy-duty warehouse floor gets its 200 lbs. per sq. ft. load rating with $25/32$" x 2¼" MFMA Third Grade Northern Hard Maple, laid over 2½" x 6" t & g subflooring. It's clean, tight, long-lasting, easy to maintain and "foot-friendly." Ask your favorite lumber dealer about this economical industrial floor. Write for "Thrifty Third" folder.

Sign of LASTING SECURITY

Continental . . . the sign of fence economy, stretches your fencing dollar by protecting persons and property years longer than ordinary fence. Continental combines galvanized fabric and heavy, better engineered fittings with sturdy fence erection, braced and counter-braced with sturdy pipe, wire and concrete. For proved features and improved protection investigate Continental before you specify any other fence.

CONTINENTAL STEEL CORPORATION
Kokomo, Indiana
Please send FREE copy of "Planned Protection"—complete manual on property protection.
Name
Address
City State

*TRADE MRK. REG. U.S. PAT. OFF.

Write for FREE fence manual

CONTINENTAL STEEL

CONTINENTAL STEEL CORPORATION

PRODUCERS OF Manufacturer's Wire in many sizes, shapes, tempers and finishes, including Galvanized. BONDTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

NEW Free CATALOGS

Begins on page B-40

54 Aluminum in Building
You'll find more than 32 industrial building applications for aluminum in this 32-page catalog (No. AD-262). Performance records, architectural details. Aluminum Co. of America.

55 Shades
Wood - splint ventilating shades are illustrated and described in this 6-page folder. Shows how shades work, tells where to install them. Section on special installations. Form No. S-308. Hough Shade Corp.

56 Constructor
A 55-page catalog lists projects of this construction company. Also describes the company and its services. F. H. McGraw Co.

57 Constructors
A 12-page catalog describes how organization completely designs, constructs, and equips plants to specifications. Illustrations and descriptions of the company's facilities. Continental Industrial Engineers, Inc.

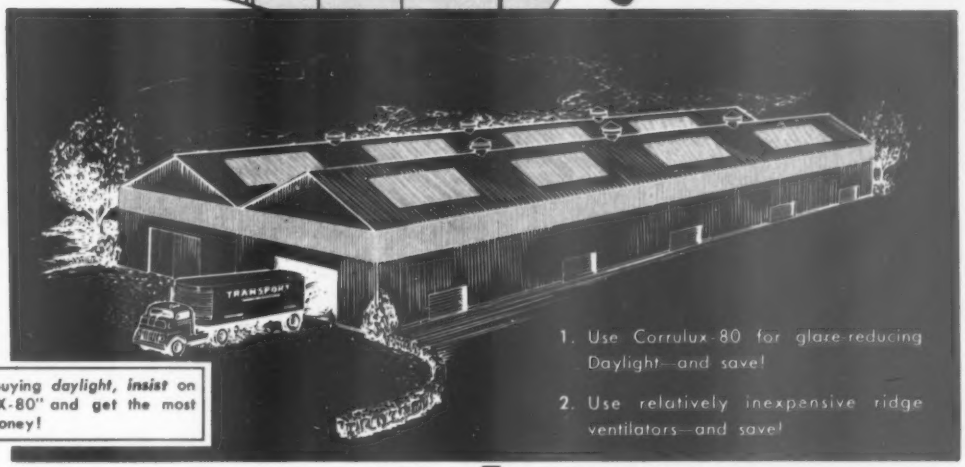
58 Constructors
Describes projects and engineering facilities of company that will build and equip your new plant on contract. Photographs illustrate the 58-page catalog. Rust Engineering Co.

59 Constructors
In this 24-page catalog there's information on a complete building service covering design, engineering, and construction. Describes the organization, lists clients, gives sample sketches of projects. Lewis C. Bowers & Sons, Inc.

To get these catalogs, circle number on reader's service postcard next to back cover.

ARE YOU BUYING AN OBSOLETE BUILDING?

Insist on the SHATTERPROOF Corrulux way...and save!


TRANSPORT
1. Use Corrulux-80 for glare-reducing Daylight—and save!
2. Use relatively inexpensive ridge ventilators—and save!

If you're buying *daylight*, *insist* on "CORRULUX-80" and get the most for your money!

SAVE	BECAUSE
1. On actual skylight costs.....	low material cost, low installation cost.
2. On steel framing..used on standard purlin spacings.	
3. On engineering.....	no monitor design necessary.
4. On labor...	no flashing, closures, framing necessary.
5. On maintenance.....	no cracked skylights—ever!

Corrulux

- flat sheets for glazing
- corrugated sheets to nest with corrugated metal or asbestos

QUALITY FEATURES	BENEFITS
1. Shatterproof material..	increased safety for personnel.
2. High strength and weather resistance.....	unaffected by drastic temperature changes and most industrial fumes.
3. Light diffusion.....	reduces eye fatigue and increases efficiency.
4. Reduces heat input in summer, heat loss in winter.....	more comfortable buildings.

Corrulux is recognized by leading architects, engineers and builders as the top quality translucent building panel.

Corrulux DIVISION
LIBBEY-OWENS-FORD GLASS COMPANY
P. O. Box 20026
HOUSTON 25, TEXAS

Please send me new Corrulux folders.

Dept. FMM-1

Name_____

Address_____

City_____ State_____

Newly completed warehouse addition at Orr Iron Co., Evansville, Ind. — processors of steel sheets and distributors of industrial, building and automotive supplies. All structural shapes and entrances supplied by International Steel.

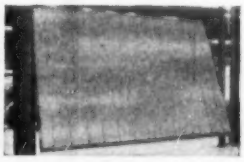
HOW TO CUT CORNERS

on your plant construction projects

Orr Iron Company's choice of International Steel—as a prime source of structural steel and doors for its newest expansion project—was more than a matter of neighborliness. Construction requirements of the century-old Orr organization were doubly exacting: (1) Proved ability to fabricate steel to exact specifications. (2) Productive capacity to "deliver the goods"... economically and on schedule. On your next plant construction project, invite International in at the planning stage. Odds are all in your favor that we can help you cut a lot of cost and time corners.

Structural Steel, Warehouse Steel, Steel Building Products

Standard Steel Buildings for All Industrial Needs



Industrial Doors, Any Type — Standard or Custom Design

INTERNATIONAL STEEL COMPANY

1952 EDGAR STREET • EVANSVILLE, INDIANA

FILM PROGRAM OF THE MONTH

BUILDINGS & GROUNDS

Here's a list of films on buildings and ground especially selected for you by the Audio-Visual Center, Washington State College. You'll find other film programs on the following pages:

PLANT SERVICES ..... Page B-138
ELECTRICAL DISTRIBUTION B-276
MATERIALS HANDLING B-344

"PHYSICAL FACILITIES" (Industrial Management Series) discusses selection of factory site and uses flow charts to illustrate factory layout. Shows how to use scale models in laying out plants. 11 minutes. For sale at $55 from:

McGraw-Hill Book Co., Text-Film Dept., 330 W. 42nd St., New York 36.

"SELECTION OF ACOUSTICAL MATERIALS" is a sound-slidefilm that deals with acoustical theory and application. You learn how to select, install, and maintain the materials. Write:

Your nearest Armstrong Cork Co. branch or district office.

"FACTS ABOUT FLOOR CARE" is intended for use in training programs for maintenance supervisors and crew men. Covers asphalt, rubber tile, and wood floors. Two sound slidefilms, each about 15 minutes. Write:

S. C. Johnson & Son, Inc., Racine, Wis.

"WALLS OF DAYLIGHT" is the story of glass block—manufacture, installation, and the advantages of using it. 23 minutes, color. Write:

American Structural Products Co., P. O. Box 1035, Toledo 1.

"TREAT WOOD RIGHT" describes the chemical treatment of wood to prevent rot and insect attack. Tells how to use the preservatives. 23 minutes, color. Write:

Dow Chemical Co., Midland, Mich.

"DEAD STORAGE" AREA AT NIGHT . . . . . TRANSFORMED INTO ACTIVE MARSHALLING YARD BY G-E OUTDOOR INDUSTRIAL LIGHTING

Small investment in G-E lighting doubles value of outdoor work areas

A LIGHT FOR EVERY NEED is available from G.E.'s full line, for example: **A** High efficiency, lightweight, easy-to-install area floodlight for crossarm mounting, with three beam spreads; **B** Heavy-duty, wide variety of mountings and beam spreads; **C** Inexpensive, open floodlight for closer-range illumination.

You can use your plant's outdoor areas just as efficiently at night as you do during the day by adding outdoor lighting. And the cost of this productive lighting is insignificant compared to your present investment in outdoor work areas.

SPEED UP MATERIALS HANDLING

Tighter production schedules, congested plant facilities, and many other factors make it necessary for you to handle raw materials, parts, and products at night. With 'round-the-clock "daytime" provided by G-E outdoor lighting, fast, efficient materials handling is made possible, with a minimum of mistakes or damage. In the plant pictured you can see how an area, almost useless in the dark, became a productive asset.

PROTECT PERSONNEL, PLANT PROPERTY

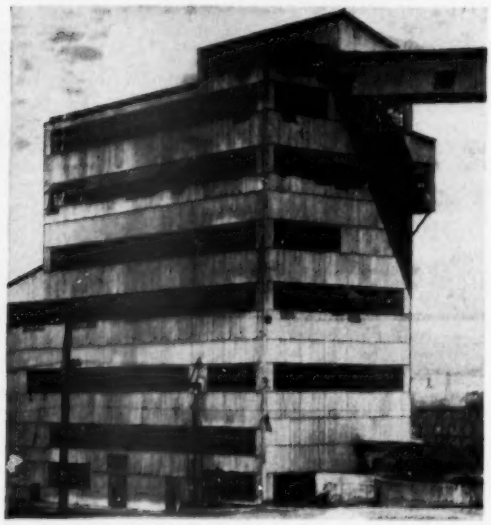
The right outdoor lighting can pay big dividends in preventing accidents, pilfering and sabotage. But it is important to get lighting that serves your needs best—money spent on inadequate lighting is often wasted. To get more information on General Electric's full line of outdoor lighting for industrial plants, write for bulletin GEA-3640, to *Section 451-172, General Electric Company, Schenectady 5, N. Y.*

OUTDOOR INDUSTRIAL LIGHTING

GENERAL ELECTRIC

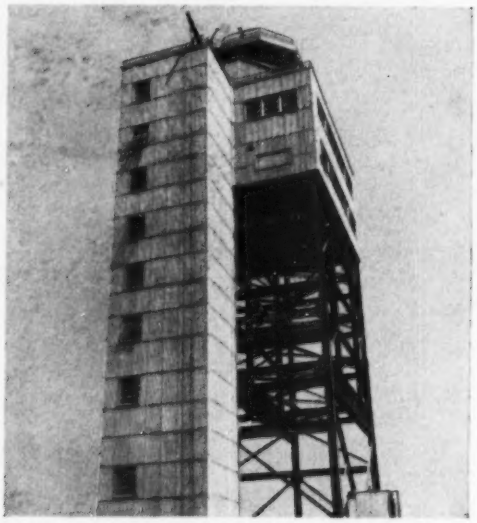
CORRUGATED *Asbestos* TRANSITE*

For Permanent Construction



This large coal breaker, roofed and sided with Johns-Manville Corrugated Transite, will provide many years of fire safety and low cost maintenance.

For Permanent Protection



Johns-Manville Corrugated Transite effectively protects the delicate instruments in this new airport control tower from the effects of severe weather conditions and fire.

You build economically and quickly with these versatile fireproof and weatherproof asbestos building sheets

In the past quarter century, Johns-Manville Corrugated Transite has proven an ideal material for roofs and for sidewalls of industrial, commercial, institutional and agricultural buildings. Made of asbestos and cement, the large sheets are easy to handle, go up quickly with a minimum of framing. Practically indestructible, Corrugated Transite is fireproof, rotproof, weatherproof, needs no paint or special treatment to preserve it, and can be salvaged and re-used if necessary.

Today, Corrugated Asbestos Transite is also used increasingly for smart interiors . . . the streamlined corrugations and attractive shadow lines that give it such unusual architectural appeal for exteriors offer unlimited interior design possibilities.

• • •

Investigate J-M Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. FM, New York 16, N. Y. In Canada write 199 Bay Street, Toronto, Ontario.

*Reg. U. S. Pat. Off.

EASY TO FASTEN TO STEEL

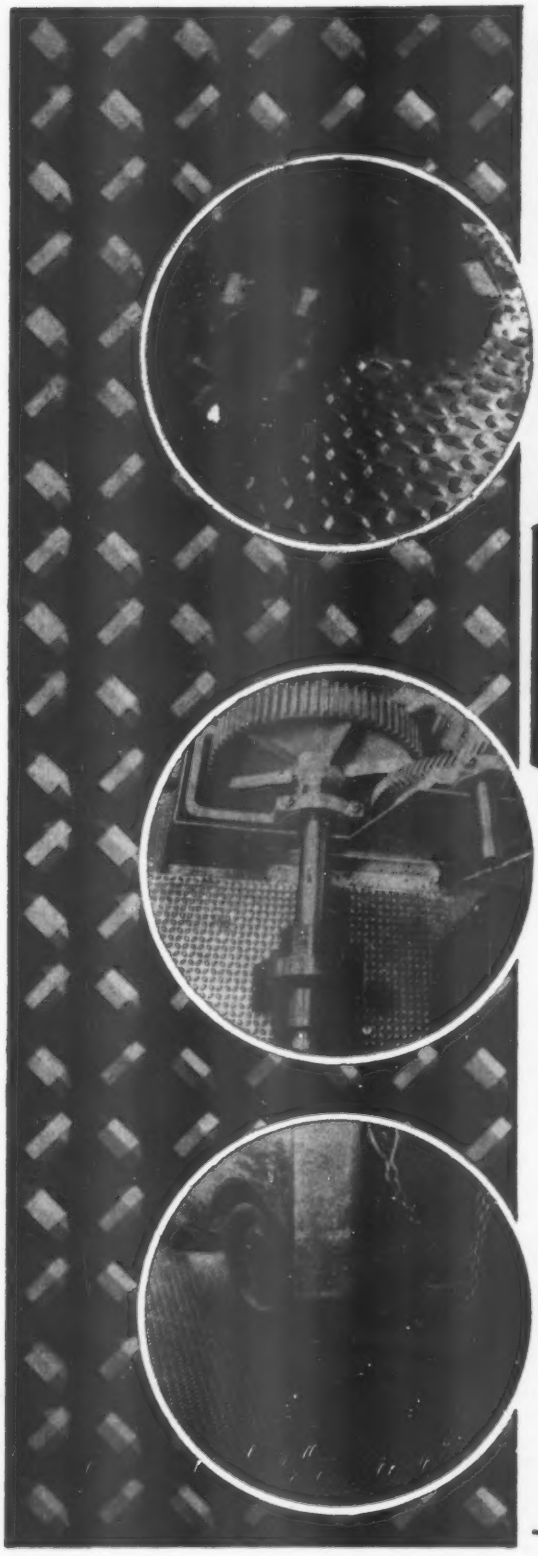
EASY TO SAW

EASY TO DRILL

EASY TO NAIL TO WOOD

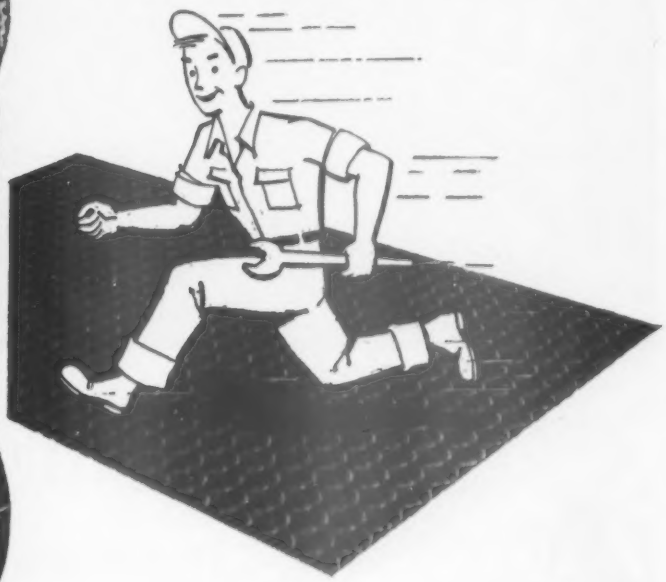
JM

Johns-Manville *Asbestos* **CORRUGATED TRANSITE**



There was a young worker named Printer
Who raced 'round the shop like a sprinter.
Now the flooring was slick,
When he tried to be quick
All he got for his pains was a splinter! . . .

Till the boss of the plant got a tip
About using non-skid Multigrip.
So he used quite a lot
On each danger spot . . .
And now Printer can rush . . . and not slip!



SAFETY UNDERFOOT. Multigrip Floor Plate is so designed that several skid-resisting risers always grip the foot, providing safe footing regardless of the direction from which the plate is approached. The flat-topped, lozenge-shaped risers are comfortable underfoot, too . . . tend to lessen accident-causing fatigue. And vehicles roll straight and true on Multigrip. There are no gutters to trap a vehicle wheel . . . wheels roll *on* the risers, not *between* them. For safety's sake, use Multigrip.

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

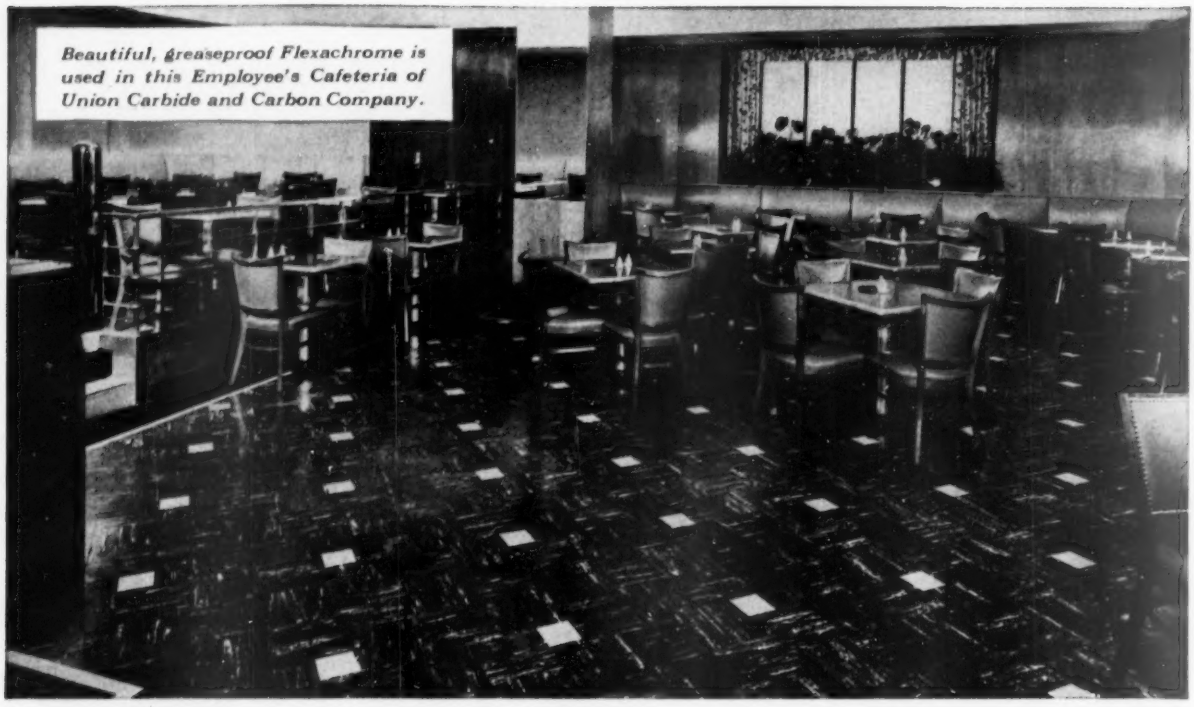
U·S·S multigrip

FLOOR PLATE

Sold by leading distributors from coast to coast

3-804

UNITED STATES STEEL



Beautiful, greaseproof Flexachrome is used in this Employee's Cafeteria of Union Carbide and Carbon Company.

Get the Special on Flooring

...Flexachrome saves money all along the line!

The special for today . . . *and every day*, for your cafeteria flooring needs . . . is Flexachrome* Vinyl Plastic-Asbestos Tile!

Smart-looking Flexachrome is the *ultimate* in composition tile . . . and is always a favorite with the management. Combines beauty and durability with moderate initial cost, minimum maintenance and long service life.

Flexachrome has a lustrous, tight-textured surface, satin-smooth finish. Its rich colors are light and clear *all the way through*. And you have over two dozen natural-looking beauties to choose from!

As for *wear*, resilient Flexachrome will take all that traffic can give. Provides excellent footing, no waxing is ever necessary.

Oils, fats, acids and alkalies aren't able to bite into Flexachrome or mar it. Stains just wipe off.

Ask your Tile-Tex* Contractor, listed in the classified pages of your telephone directory, to show you how quickly and economically old, worn floors can be replaced with beautiful, long-lasting Flexachrome.

THE TILE-TEX DIVISION, *The Flintkote Company, 1234 McKinley Street, Chicago Heights, Illinois*

Tile-Tex—Pioneer Division, The Flintkote Company, P. O. Box 2218 Terminal Annex, Los Angeles 54, Calif.

The Flintkote Company of Canada, Ltd., 30th Street, Long Branch, Toronto, Canada

*Registered Trademark, The Flintkote Company

TILE-TEX...*Complete* Flooring Service

Profits depend on a Modern Plant...

Do you have one?

ONLY a modern plant can assure continuing profits in the face of growing competition. Do you enjoy all the advantages of a modern plant? Or are your profits suffering, due to inefficient operating methods, obsolete equipment or inadequate facilities?

Many companies with critical operating problems are finding the practical way to attain peak production efficiency and top profits—through *plant modernization* by EBASCO.

EBASCO offers you any or all of the following:

- **Complete survey of plant needs by an experienced team of engineers, constructors and business consultants.**
- **Recommendations for overall plant modernization, or assistance with portions needing improvement.**
- **Complete design and construction services.**

LET'S DISCUSS YOUR PROBLEM

EBASCO is ready to consult with you. Its competent engineering team can prepare a modernization plan that best meets your individual requirements, yet *pays for itself*. No obligation for preliminary discussions.

So call on EBASCO to get the help you need.

EBASCO SERVICES

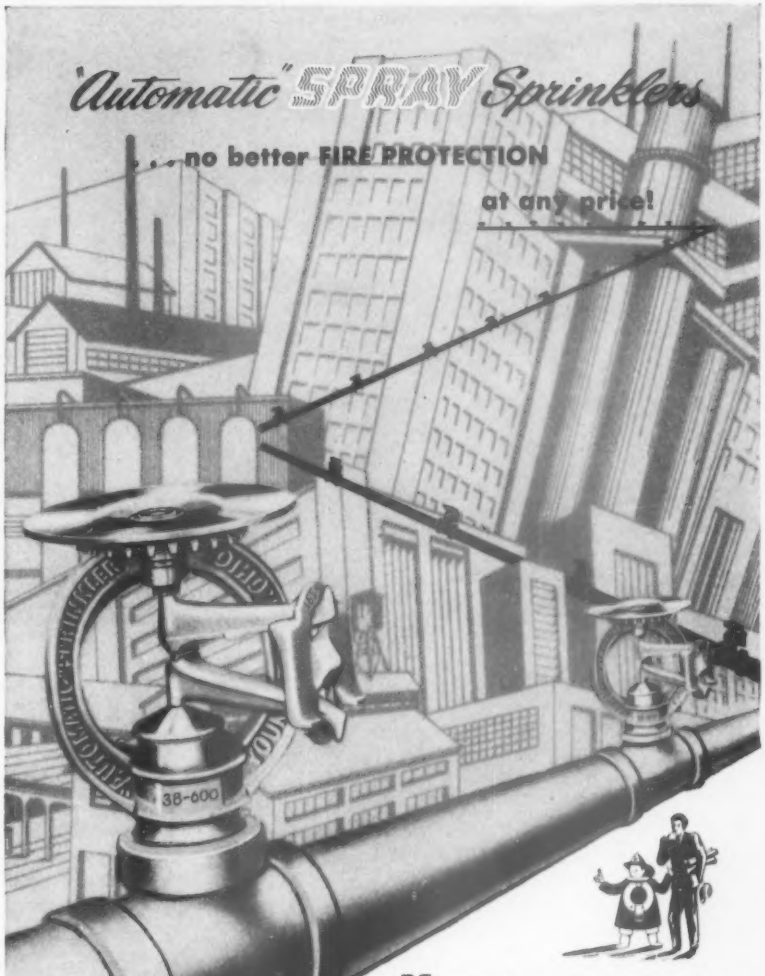
INCORPORATED

Two Rector Street, New York 6, N.Y.

Ebasco Teamwork gets things done anywhere in the world.

ENGINEERS · CONSTRUCTORS · BUSINESS CONSULTANTS — EBASCO

Appraisal · Budget · Business Studies · Consulting Engineering
Design & Construction · Financial · Industrial Relations
Inspection & Expediting · Insurance & Pensions
Purchasing · Rates & Pricing · Research · Sales & Marketing
Systems & Methods · Taxes · Traffic



HERE'S important news for insurance underwriters; building owners; safety, maintenance and planning engineers.

Now, with *new*—more efficient "Automatic" SPRAY Sprinklers, it is possible to obtain substantially improved fire protection *at no extra cost.* Leading insurance organizations consider them superior to conventional approved sprinklers. They are suggested for use on all new construction, and can easily be interchanged with obsolete devices on old style systems without expensive piping rearrangement.

In short, absolute fire safety with "Automatic" SPRAY Sprinklers is worth far more than it costs. It's a long-lasting value that knows no measure.

Better get the facts on "Automatic" SPRAY Sprinklers, the most important advancement of the century in the science of fire protection. Fill out and mail the coupon below for illustrative literature.

"Automatic" Sprinkler

CORPORATION OF AMERICA

YOUNGSTOWN, OHIO

Offices in principal cities of North and South America

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
DEPT. K Youngstown 1, Ohio
SEND US BULLETIN 69, "AUTOMATIC" SPRAY SPRINKLERS.

NAME .....
TITLE .....
COMPANY .....
CITY ..... ZONE .....
STATE .....

this is GLASS

The TIME-TESTED MATERIAL

- **It is non-combustible... won't burn.**
- **It is rigid... doesn't sag or warp.**
- **It has a permanently hard, impervious surface, not affected by time, abrasion or exposure to the elements.**
- **It won't corrode or stain.**
- **It resists chemicals—acids, solvents, etc.**
- **It retains its original clarity, brilliance and lustrous beauty.**
- **It is easily installed, maintained and cleaned by conventional methods.**

The traditionally-preferred material for window and skylight glazing, glass, and glass alone, gives you the proven performance you need for better daylighting at ultimately the lowest cost.

Send for free catalog, "ABC's of ROLLED GLASS" Samples on request.

There is no Substitute for GLASS!

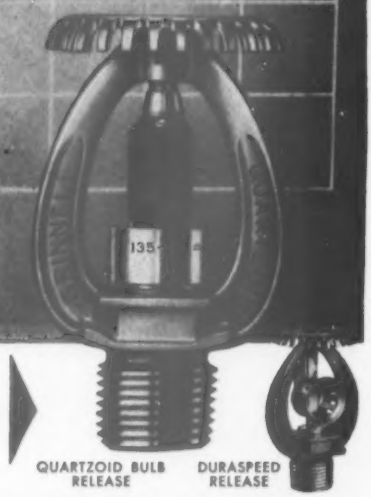
MISSISSIPPI Glass COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.

NEW YORK • CHICAGO • FULLERTON, CALIF.

WORLD'S LARGEST MANUFACTURER OF ROLLED FIGURED AND WIRED GLASS

Grinnell Automatic Spray Sprinklers



provide:

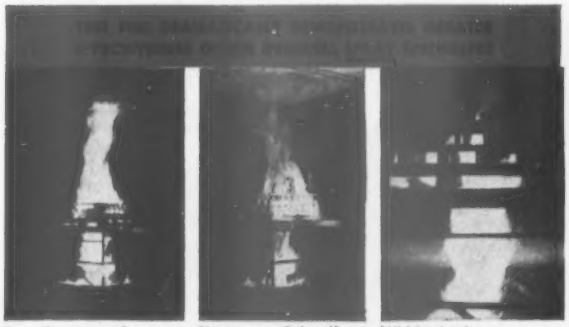
- better protection—the greater the hazard, the greater the improvement in protection
- more efficient water distribution—*less* water puts out *more* fire
- more uniform coverage—from multiple operation or from a single sprinkler
- more effective ceiling protection—without wetting the ceiling
- lowered ceiling temperatures—no unnecessary sprinkler openings

why

- cool fire gases to prevent fire spread — by faster evaporation of smaller water droplets
- control fire by producing an unburnable mixture of flammable vapors and water vapor
- dilute and diminish supply of flammable vapors with water vapor . . . evaporation of water removes heat, stops distillation of flammable vapors from solids — many liquids.

features

- interchangeable with conventional sprinklers — without piping changes
- unexcelled release mechanisms — with either the Grinnell Quartzoid Bulb or DuraSpeed
- one-piece deflector — rugged and durable, manufactured to close tolerances for maximum effectiveness
- approvals — listed by Underwriters' Laboratories, Inc.; approved by Factory Mutual Laboratories



Test fire is under way. Under the wood crib is a torch fed by a constant flow of gasoline which prevents extinguishment of the fire. The vapors distilled off from both wood crib and gasoline torch feed the flames which lick ceiling panel.

Heat opens Grinnell upright spray sprinklers. Flame column starts to thin out and break up under the attack of fine sprays. Water vapor from these sprays dilutes the flammable fire gases to extinguish the destructive flames.

Within 4 minutes, sprays have practically killed the fire. After 30 minutes, with torch still roasting wood crib, it was far from destroyed. Ceiling panel was only slightly flame-blackened — even though no water was directed against it.

Send for booklet describing Grinnell Spray Sprinklers in detail.
Grinnell Company, Inc., Providence, R. I.
Sales offices in principal cities.

GRINNELL
FIRE PROTECTION SYSTEMS

Manufacturing, Engineering and Installation of Automatic Sprinklers Since 1878

THAT SETTLES IT- WE INSTALL

J&L JAL-TREAD

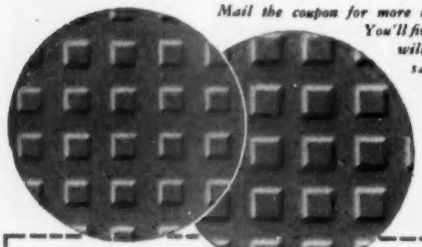
FLOOR PLATES

The safety of your employees and the public is good enough reason to install walking surfaces of slip-resistant J&L Jal-Tread floor plate.

But here are some other important advantages you'll get when you specify Jal-Tread, the only true checkerboard floor plate.

- Reduced worker fatigue from feet rocking on uneven surfaces.
- No wheel shimmy in hand industrial trucks.
- Neat appearance . . . easy draining and sweeping in any direction.
- Easy fabrication—square design allows cutting without shearing through raised cleats . . . welding joint of uniform thickness.
- Easy cold-forming on standard equipment.

Mail the coupon for more information today. You'll find J&L Jal-Tread will pay off in greater safety . . . lower maintenance costs.



J&L STEEL

Jones & Laughlin Steel Corporation
407 Gateway Center
Pittsburgh 30, Pa.

☐ Please send me your free booklet on J&L Jal-Tread.
☐ Please have your representative call.

Name_____

Company_____

Address_____

Searchlight Can Help You!

HUNDREDS of miscellaneous business problems that confront you from time to time, can be quickly and easily solved through the use of the Searchlight Section of this or other McGraw-Hill publications.

The SEARCHLIGHT SECTION Classified Advertising of McGraw-Hill Publications

Can help you by bringing business needs of "opportunities" to the attention of other men associated in executive management, sales and responsible technical, engineering and operating capacities with the industries served by:

American Machinist
Aviation Week
Business Week
Bus Transportation
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Electrical Construction & Maintenance
Electrical Merchandising
Electrical World
Electronics
Engineering and Mining Journal
Engineering News-Record
E. & M. J. Markets
Factory Management and Maintenance
Fleet Owner
Food Engineering
Nucleonics
Power
Product Engineering
Textile World
Welding Engineer

The Searchlight Section is the classified advertising appearing in each of these papers. You can use it at small cost, to announce all kinds of business wants of interest to other men in the fields served by these publications. It is the regular meeting place of the man with a miscellaneous business need and the men who can fill that need.

When you want additional employees, want to buy or sell used or surplus equipment, want additional products to manufacture, seek additional capital, or have other miscellaneous business wants — advertise them in the Searchlight Section for quick profitable results!

Classified Advertising Division

McGRAW-HILL PUBLISHING CO., Inc.
330 West 42nd Street New York 36, N. Y.

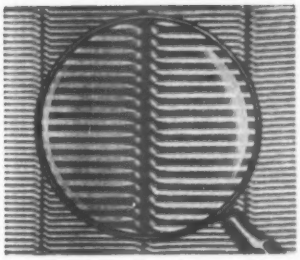
KAISER ALUMINUM SHADE SCREENING covers 10,000 square feet of windows on 7 buildings of Lockheed Aircraft Corporation's Burbank, California plant. Interiors are glare-free, far cooler, more comfortable for work. Reduces worker fatigue; improves morale. Notice how this screening assures a smooth band of windows, resulting in a modern, beautiful facade.

BEFORE Kaiser Aluminum Shade Screening . . .

AFTER Kaiser Aluminum Shade Screening

KEEP INTERIORS UP TO 15° COOLER!

. . . at surprisingly low cost



Now you can get low-cost relief from the sweltering summer sun—with Kaiser Aluminum Shade Screening. Here's how this remarkable cooling device works:

◀ Thousands of small horizontal louvers, permanently tilted at a slight downward angle, block the hot sun's rays outside the window. Result: Rooms up to 15° cooler, glareless light and indoor shade; protection against insects. Air circulates freely. Daytime privacy assured because outsider's view is blocked, although you can see out.

Cuts air conditioning costs

Even without air conditioning, Kaiser Aluminum Shade Screening gives low-cost protection against summer sun. Where new air conditioning is planned, substantial savings are often possible through use of smaller units. Existing units operate less often—more economically. Kaiser Aluminum Shade Screening does the work of venetian blinds, awnings, and ordinary screens at less than the cost of awnings alone! Requires minimum maintenance. Durable, high grade aluminum, can't rust—won't cause ugly red streaks on buildings. Never needs painting.

ACT NOW! Send coupon below for free sample demonstrator.

Kaiser Aluminum

SHADE SCREENING

FREE DEMONSTRATOR! Actual sample of Kaiser Aluminum Shade Screening shows how it blocks sun rays. Full information and name of your nearest dealer included. Mail coupon now!

KAISER ALUMINUM & CHEMICAL SALES, INC.
Consumer Service Division
252 Kaiser Bldg., Oakland, California

Name_____

Address_____

City_____ State_____

An Invitation

to consider BETTER PLANT locations in New York State

Manufacturing firms and consulting engineers must work with unbiased, ungarnished facts in planning and studying a new industrial location.

One of the many industrial services of the New York State Department of Commerce is to provide facts on any community or area of New York State . . . facts often difficult to obtain from other sources . . . for your consideration. There is no charge or obligation and a representative will call only at your request.

Whether it's economics, transportation, raw material or natural resources, State and local regulations, site evaluation or community analysis, all information is tailored to your specifications by a competent staff of experts . . . who avoid "boosterism" and pressure . . . men who respect your confidence.

FREE physical map of New York State and adjacent areas . . . 45″ x 34″ in full color . . . shows elevations, boundaries, State parks, railroads, canals, major highways and population. Write Bureau of Business Promotion, New York State Department of Commerce, 112 State Street, Albany 7, N. Y.

Write, wire or phone for immediate confidential service.

STATE OF NEW YORK
Thomas E. Dewey, Governor

DEPARTMENT OF COMMERCE
Harold Keller, Commissioner

112 STATE ST. ALBANY 7, N. Y.

New Ceiling on Noise and On Cost!

Reynolds Aluminum Acoustical Ceiling being installed in Naval Ordnance Plant, Pomona, Cal., operated by the Pomona Division of Consolidated Vultee Aircraft Corporation to build guided missiles.

Ideal for any large expanse... offices, schools, hospitals, industrial production and office areas!

Effective noise reduction, with the increased efficiency and safety it promotes, can now be brought to any large area with minimum work interruption and maximum speed. And the end result is distinctive appearance and exceptional performance... at amazingly low cost.

It's all done with large perforated panels of Reynolds Aluminum, attractively formed and finished... simply laid in place with sound-absorbent backing (see diagram), and just as simply taken down for access to space above.

Though military needs limit general supply, millions of square feet have already been installed and millions more are now being specified by leading architects. Call the nearest of the listed Franchised Applicators, or write us for literature. **Reynolds Metals Company,** Louisville 1, Ky.

Low Cost. Low material cost; fast, labor-saving installation.

•

High Sound Absorption. Up to .90 and high at all frequencies.

•

Unlimited Access to utilities... any section movable at will.

•

Low Maintenance. Rustproof, non-staining panels removable for cleaning.

•

Fire Resistant. Both aluminum and sound-absorbent backing are incombustible.

•

High Thermal Insulation. Greatly reduces summer cooling and winter heating costs.

•

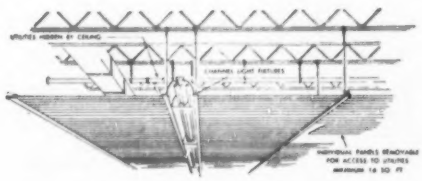
Low Weight. Completed ceiling weighs less than one-half pound per square foot.

•

Modern Design. Eye-pleasing corrugations in straight-line or pattern effects.

•

Adaptability to any air-conditioning, including plenum chamber above panels.



TYPICAL INSTALLATION. Panels are supported on aluminum angles and T-sections. Sound-absorbing material is laid on panels or attached directly to ceiling.

FRANCHISED APPLICATORS

ALABAMA: Badham Insulation, Birmingham; Stokes Interiors, Mobile.

CALIFORNIA: Pacific Acoustics, Los Angeles; Sound Reduction, Oakland.

COLORADO: Danco, Inc., Denver.

CONNECTICUT: Wilson Construction Co., Hartford.

DISTRICT OF COLUMBIA: T. M. Woodall, Inc., Takoma Park.

FLORIDA: Standard Insulation, Fort Lauderdale; Cliff Haller, Orlando.

GEORGIA: Lewis & Co., Atlanta.

ILLINOIS: Anning-Johnson Co., Chicago.

INDIANA: Brown-Anning-Johnson, Inc., Indianapolis.

IOWA: Anning-Johnson Co., Des Moines.

KENTUCKY: Braun Acoustical Co., Louisville.

LOUISIANA: Walker Lloyd, Baton Rouge.

MAINE: Edw. F. Byrnes Co., Portland.

MARYLAND: Limbach Co., Hagerstown.

MASSACHUSETTS: Edw. F. Byrnes Co., Boston.

MICHIGAN: Nichols Co., Detroit; Harold R. Sobie Co., Grand Rapids.

MINNESOTA: Anning-Johnson Co., Minneapolis.

MISSISSIPPI: Stokes Interiors, Jackson.

MISSOURI: Hamilton Co., St. Louis; Stokes Co., Kansas City.

NEW JERSEY: Woolsulate, East Orange; W. M. Meyer Co., Quakerstown.

NEW MEXICO: Welch-Erwin, Albuquerque.

NEW YORK: Albany Acoustical Corp., Albany; A. P. Madden Co., Syracuse; Davis-Fetch, Buffalo, Rochester, Jamestown; Wm. J. Scully Corp., New York.

N. & S. CAROLINA: Bonitz Insulation, Greensboro, Columbia.

OHIO: Gellin Co., Cleveland; J. H. Archibald Co., Cincinnati.

OKLAHOMA: Ball Dist. & Eng. Co., Tulsa, Oklahoma City.

OREGON: Steward Griffith Co., Portland.

PENNSYLVANIA: Limbach Co., Pittsburgh; W. M. Meyer Co., Philadelphia.

TENNESSEE: Alexander Co., Memphis; John Beretta Co., Knoxville; Workman Co., Nashville.

TEXAS: C. F. Schilling Co., Houston; Gen'l Supply Co., San Antonio; Acoustic Builders Co., Dallas; Welch-Erwin, El Paso.

VIRGINIA: McL. T. O'Ferrell & Co., Richmond.

WASHINGTON: G. D. Bradley Co., Seattle.

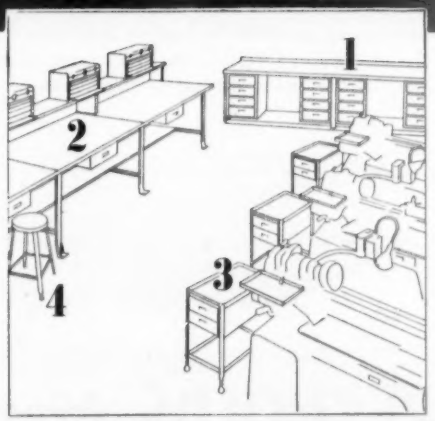
WISCONSIN: DeGelleke Co., Milwaukee.

REYNOLDS *Lifetime* ALUMINUM ACOUSTICAL SYSTEM

A MODERN TOOLROOM — CUSTOM BUILT with Standard HALLOWELL Shop Equipment

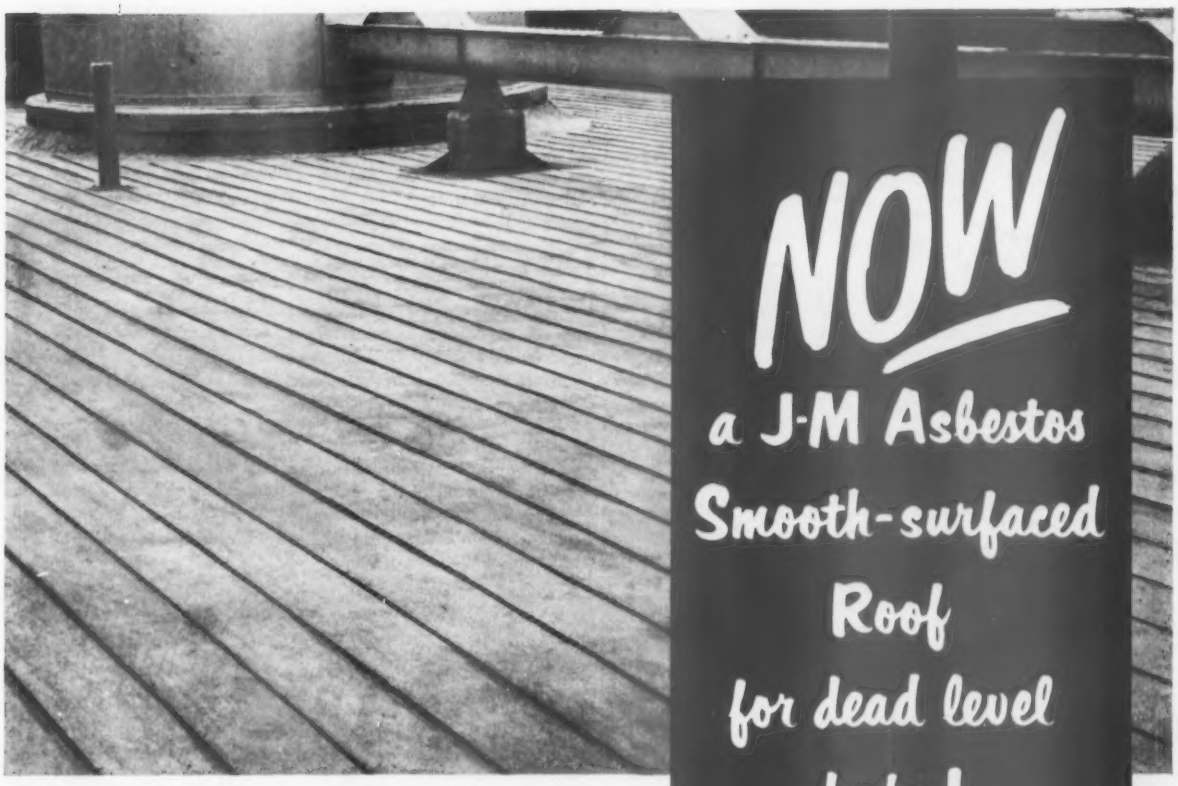
Design it as you want it—set it up with standard HALLOWELL Shop Equipment. Ample storage space provides protection for your tools and gages, promotes good housekeeping. Let us send you details—then order standard ready-made units from your nearest authorized HALLOWELL distributor. SPS, Jenkintown 11, Pa.

Our Fiftieth Year : A START FOR THE FUTURE



1. Cabinet Benches
2. Work Benches
3. Tool Stands
4. Adjustable Stools

HALLOWELL® SHOP EQUIPMENT DIVISION SPS JENKINTOWN PENNSYLVANIA



The Johns-Manville Flexstone *Special* Built-Up Roof...

THE J-M Asbestos FLEXSTONE* SPECIAL Roof has been developed for decks from dead level to ½″ pitch per foot. It is the result of extensive experimentation in the Johns-Manville Research Center and years of successful tests in the field. Now for the first time you can utilize the proven advantages of the well-known J-M Flexstone Asbestos Roof *on flat or nearly flat decks.*

Smooth-surfaced to afford good drainage and make maintenance and repairs easier!

No gravel or slag—cuts down excess weight and saves labor costs!

Made of asbestos—J-M Flexstone Felts are made of fire-rot-and weatherproof asbestos. They last longer and give more enduring protection.

Won't dry out—Because they are made of mineral asbestos, Flexstone Felts are unique in their resistance to the destructive effect of sun!

For your added protection, the Johns-Manville Asbestile* System of Flashing insures proper treatment of all critical areas. Asbestile is a heavy-bodied plastic cement designed for use with asbestos flashing felts to give thorough water-tightness. As it sets, Asbestile forms an integral part of the wall itself.

Flexstone Roofs are applied only by J-M Approved Roofers. For full information on Flexstone Roofs and Asbestile Flashing Systems, send for brochure BU-68A. Write Johns-Manville, Box 158, Dept. FM, New York 16, N. Y.

*T.M. Reg. U. S. Pat. Off.

JOHNS MANVILLE JM PRODUCTS

Made of ASBESTOS

Johns-Manville FLEXSTONE Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS

DECORATIVE FLOORS • MOVABLE WALLS • ETC.

ALCOA lets in the DAYLIGHT with RESOLITE

the shatterproof, weatherproof, translucent panel made of polyester resins, reinforced with a blanket of Fiberglas mat.

Greater Visual Comfort. Resolite diffuses daylight in all directions, eliminating the harsh contrast of sunshaft and shadow, present in conventional skylights and window glazing. Improvement in visual comfort means greater personnel efficiency, fewer accident hazards.

Maintenance-Free. Shatterproof Resolite puts an end to broken panes and skylights in factories where replacement is high due to flying objects, severe vibration, sudden temperature changes. Resolite is unaffected by usual industrial fumes and weather extremes of heat, cold or moisture.

Low Cost Installation. In corrugated sheet construction, new or old, plant lighting sources through roof or walls are made by simple replacement of the regular roofing or siding sheet with the matching Resolite corrugation — without flashing, caulking or special framing. Doors and sashes are glazed in the usual way with flat Resolite sheets or panes.

The new Port Lavaca (Texas) plant of the Aluminum Company of America is amply daylighted with large areas of Resolite nested with Alcoa corrugated aluminum roofing and siding sheets.

For complete information, technical data, specifications and name of your nearest distributor, write

RESOLITE CORPORATION
P. O. BOX 503
ZELIENOPLE, PA.

INDUSTRIAL BUILDINGS

Designed • Constructed • Leased

Complete Package • One Contract
Specialists in low cost functional plants

Regional warehouse and offices—B. F. Goodrich Company, Philadelphia, 1952

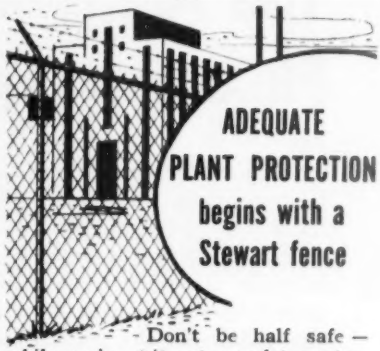
Other Recent Clients

Coty, Inc.	General Motors Corp.	Delco Products
Premier Foods	Alleghany Ludlum Steel Co.	Certain-Teed Products Corp.

Preliminary sketches and estimates prepared for management consideration.

Write or Telephone

Lewis C. BOWERS & Sons, Inc.
Princeton, New Jersey
Since 1901



ADEQUATE PLANT PROTECTION begins with a Stewart fence

Don't be half safe — while you're at it, get complete protection. It could save you many thousands of dollars and countless hours of lost production. Plant protection is our business, so talk it over with Stewart. We produce many products designed for this purpose. For example: chain link wire and iron picket fence; wire window guards; wire mesh partitions; steel folding gates, and skylight guards. Also, all-steel settees, steel flagpoles, bronze plaques and other items. Stewart literature gives you the whole story. Write for it today.

THE STEWART IRON WORKS CO., INC.
2056 Stewart Block, Cincinnati 1, Ohio
Experts in Metal Fabrications since 1886

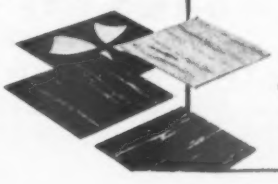
Stewart IRON and WIRE FENCES

MONEY GOES DOWN EVERY TIME A FLOOR IS INSTALLED

That's why good management means choosing the *right* flooring for every installation. Because, flooring vitally affects your operating expenses... as well as the efficiency and morale of your staff.

And, it's good management to call on a Kentile, Inc. Flooring Contractor! He can bring to you the specialized knowledge and experience that means time, work and money saved on every kind of commercial, industrial and institutional flooring installation.

Be sure to call on him for whatever assistance you need... whether it is for new construction or the remodeling of existing facilities.

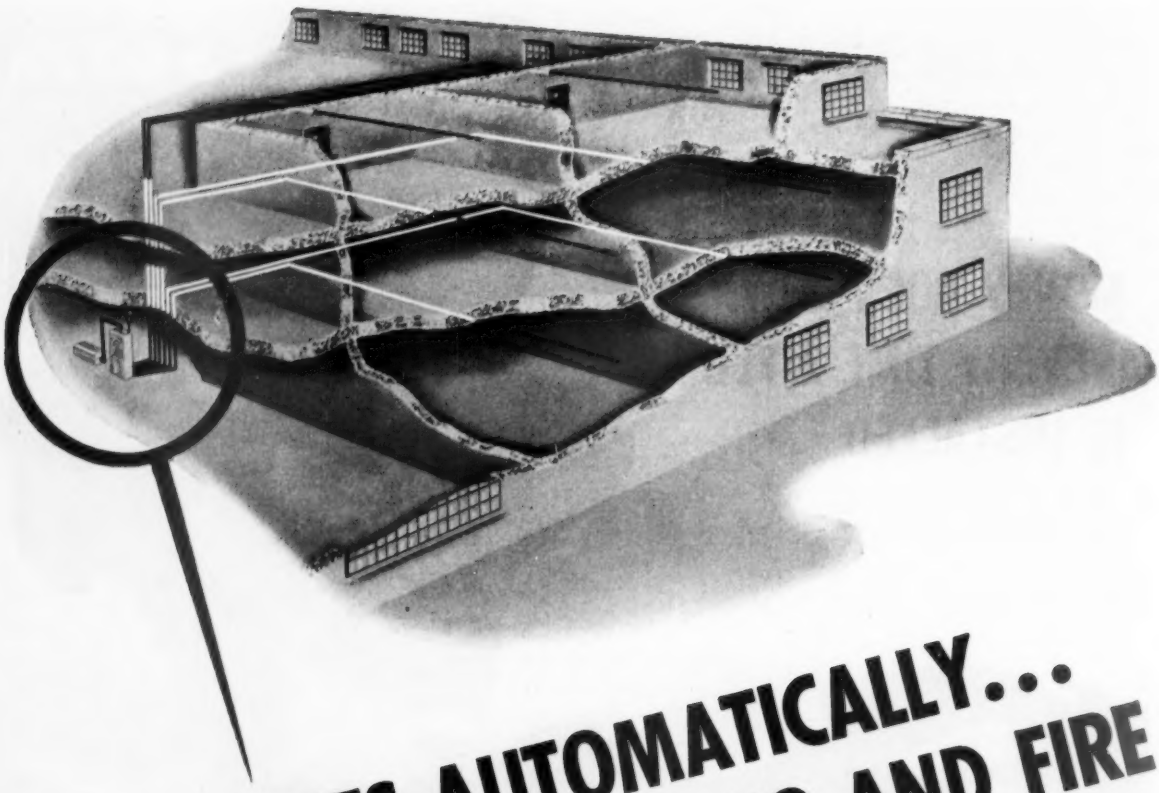


Call the Kentile, Inc. Flooring Contractor* for up-to-date information about these floors

- ✓ *KENTILE ASPHALT TILE*
- ✓ *KENCORK FLOORS AND WALLS*
- ✓ *KENRUBBER TILE FLOORS*
- ✓ *SPECIAL (greaseproof) KENTILE*
- ✓ *KENFLEX VINYL TILE*

KENTILE INC.

*If you don't know the name of your Kentile, Inc. Flooring Contractor look under FLOORS in your Classified Phone Directory or write Contract Dept., Kentile, Inc., 58 2nd Ave., Brooklyn 15, N. Y.



DETECTS AUTOMATICALLY... SMOKE, SMOLDERING AND FIRE

at any location in your plant or warehouse!

Each fire hazard point gets highly efficient, round-the-clock fire watchman service simultaneously, when a building is completely protected with a modern, fully approved C-O-TWO Automatic Smoke Detecting System.

The first whiff of smoke sets off an alarm, based on an exclusive operating principle . . . no chance of smoke, smoldering or fire spreading . . . instantly, the air conditioning shuts down, doors and dampers close, operating equipment stops and fire extinguishing systems actuate . . . a truly automatic fire watchman.

Four types of smoke detectors and several installation arrangements are available to fit your particular needs . . . single space systems, double space systems, multiple space systems, air conditioning duct systems . . . all function by drawing continuous air samples through simple piping to a smoke detector.

Actual fire tests made by the Underwriters' Laboratories, Inc. show that fire detection with this type of smoke detecting equipment is much quicker than other methods . . . because usually there is smoke or smoldering before flames break out.

Remember fire doesn't wait . . . so, with current expensive delayed replacements, why not let an expert C-O-TWO Fire Protection Engineer help you now in planning economical, fully approved fire protection facilities. Write today for complete free information . . . no obligation.

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY

C-O-TWO FIRE EQUIPMENT OF CANADA, LTD. • TORONTO 8 • ONTARIO

Sales and Service in the Principal Cities of United States and Canada

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

The most widely used high temperature block insulation for over a quarter century...

SUPEREX® high temperature block insulation has long been industry's No. 1 choice for service temperatures up to 1900F. It provides *major* economies . . . reduces fuel costs, cuts heat losses, keeps maintenance expense down, costs less to install and has long service life.

These are the reasons why 90% of the nation's hot blast stoves are Superex insulated . . . and why the low cost open hearth steel producers use Superex in their regenerators.

Made of specially selected and calcined diatomaceous silica blended with other insulating materials and bonded with asbestos fiber, Superex will safely withstand temperatures up to 1900F with negligible shrinkage.

Superex has been used with outstanding success in all types of industrial and metallurgical furnaces and ovens, stationary and marine boilers, auxiliary power plant equipment, regenerators, kilns, roasters, high temperature mains, flues and stacks.

Superex has all these important advantages...

Low thermal conductivity—Exceptionally high heat resistance (1900F) combined with excellent insulating value.

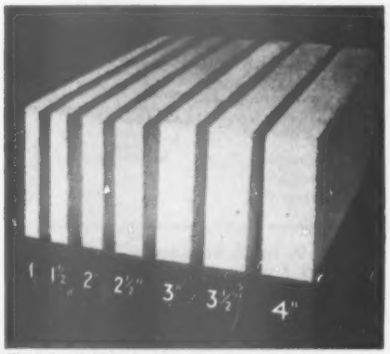
Light weight—Approximately 2 lb per sq ft per in thickness.

Great physical strength—Approximately 6 tons pressure per sq ft are required to compress Superex ½ in.

Long, efficient service life—Superex maintains high insulating value indefinitely—will not disintegrate in the service for which it is recommended.

Fast, easy application—Superex may be cut with an ordinary knife or saw for fitting around openings or to irregular surfaces. Because of its light weight and convenient sizes, Superex assures fast and economical installations.

For complete information about Superex block insulation, write for Brochure IN-134A. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, write 199 Bay Street, Toronto 1, Ontario.



Waste is minimized with Superex because of the variety of thicknesses available. Special shapes and intermediate thicknesses between those shown are also available.

JOHNS MANVILLE JM PRODUCTS **Johns-Manville** *first in* **INSULATIONS**

Meet a

high-priced executive

His take-home pay isn't so much. But he costs his firm more than a couple of vice-presidents.

He squanders dollars—using inferior floor polishes, stripping, waxing and stripping again in an endless and costly cycle. He exposes his company to heavy claims for damages—the result of accidents on slippery floors.

Mr. Maintenance Manager, if this man works for you, it's time you put him wise to the LEGGE System of Safety Floor Maintenance. LEGGE gives you floors that gleam *without slipperiness.* Your polished surfaces hold up even under the roughest abuse, because LEGGE Safety Polishes can't be "walked off". Many buildings report up to *98%* reduction in slip-accidents, *25%* savings on materials, *50%* savings in labor. One well-known institution cut its maintenance budget from $60,000 to $40,000 by adopting the LEGGE System.

Note: There is no single cure-all product suitable for *all* floors. The polish that performs wonders on linoleum may prove damaging to asphalt tile. The cleaner that makes a new floor sparkle may not be up to removing the ground-in dirt and old wax of a 20-year-old floor.

That's why we custom-tailor LEGGE Safety products to specific needs. For important facts about *your* floors, write, telling us their composition, area and age. WALTER G. LEGGE COMPANY, Inc., 101 Park Ave., New York 17, N. Y. Branch Offices in principal cities. In Toronto—J. W. Turner Co.

YOU'RE SAFE WHEN YOU HAVE LEGGE TO STAND ON

LEGGE SYSTEM of Safety Floor Maintenance

Walter G. Legge Company, Inc. Dept. A-5
101 Park Ave., New York 17, N. Y.

Gentlemen:

☐ I'd like to know what Legge Safety Products can do for my floors. I have approximately _____ sq. ft. of _____ (composition).

☐ Send me your FREE booklet, "Mr. Higby Learned about Floor Safety."

Name_____

Firm_____

Street_____

City_____ Zone_____ State_____

Transite Pressure Pipe for your industrial water lines...

because its tight joints

Protect Against Leakage

By the use of the Simplex Coupling, Transite* Pipe reduces costly water losses from joint leakage. And, equally important, it guards against failures caused by leaks which undermine pipe support. The Simplex Coupling, standard for Transite Pipe was engineered by Johns-Manville for tight, trouble-free joints that protect the line.

Consists of only three parts. The easily assembled Simplex Coupling is simplicity itself. This factory-made joint consists of a machined Transite sleeve and two rubber rings. When assembled, these two rubber rings are compressed between sleeve and pipe to form a tight, yet flexible, seal between pipe lengths. Correct location of rings can be easily checked at time of installation, using a simple hand gage.

Flexibility, too, guards against leakage. Because each joint is flexible and is capable of deflection, the entire Transite line has flexibility. This enables the line to conform readily to soil shifts, and to absorb vibrations that cause joint leakage.

Joint tightness is only one of many installation and operating advantages of a Transite Pipe System for your plant. Why not write for more information about this long-lasting, corrosion-resistant, asbestos-cement pipe? For your copy of booklet TR-11A, write Johns-Manville, Box 60, New York 16, N. Y.

*Transite is a registered Johns-Manville trade mark

JM

Johns-Manville

TRANSITE PRESSURE PIPE

for Water Supply Lines • for Fire Lines • for Process Lines

Are your floors the *Weak Link* in production?

Production should keep on the move

. . . but it can't move smoothly and economically over cracked and broken floors.

That's why, today, more and more plant managers and engineers insist on Flintkote *Cold-Laid Asphalt Mastic* wearing surfaces for industrial floors.

Asphalt Mastic—made with cement, aggregates and time-tested Flintkote Flooring Emulsions—goes down fast, cures quickly, and may be opened to traffic early. Laid in thin or thick section over new or old floor bases, it withstands the heaviest trucking you want to impose.

Flintkote Cold-Laid Asphalt Mastic is resilient, shock absorbing, quiet, comfortable under foot and easy to maintain.

Keep production rolling over floors that can take it! Let us send you suggested specifications for installation by contractor or your own forces, resurfacing and patching old floors. Write today.

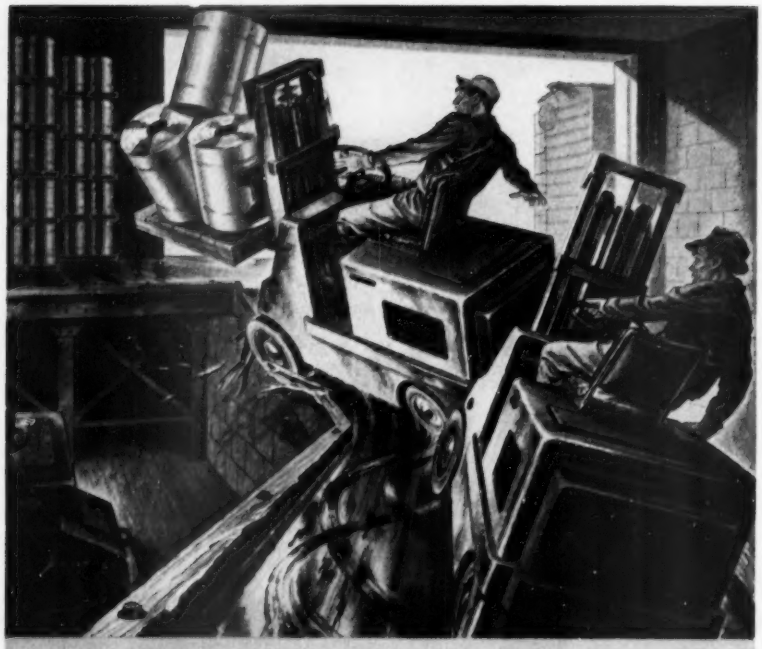
Over 50 years specialized experience. At your service by phone, mail or personal call ...no obligation.

FLINTKOTE
Products for Industry

THE FLINTKOTE COMPANY, *Industrial Products Division*, 30 Rockefeller Plaza, New York 20, N. Y. 55th & Alameda Sts., Los Angeles 54, Calif.

In Toronto, Ontario: THE FLINTKOTE COMPANY OF CANADA, LTD.

In London, England: Industrial Asphalts Company, Ltd.



. . . THEN WE INSTALLED ALGRIP
Thus Doubling Production Efficiency And Lowering Big Insurance Costs

In a large Eastern rolling mill, a ramp from the production floor to a storage area above was so slippery from oil and grease drippings that a fork-lift truck could not climb the incline by itself. An unloaded fork-lift truck had to push the loaded one. Already a safety hazard, the slippery ramp also caused production inefficiency.

INCREASED: Production efficiency by more than 50%

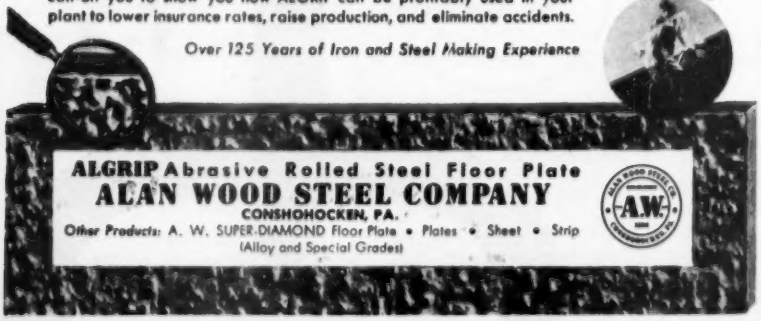
LOWERED: Accident insurance premiums to save thousands of dollars.

When A.W. ALGRIP Abrasive Rolled Steel Floor Plate was installed on the ramp, skidding stopped, accidents were eliminated, and one truck did the job better than two did before. *Greater production efficiency and lowered insurance rates paid for the ALGRIP installation.* Safe for vehicles as well as men, ALGRIP gives even steep inclines a hard-gripping, anti-skid surface.

In ALGRIP, tough abrasive particles (the same as used in grinding wheels) put hundreds of tiny safety brakes in every footstep—making it virtually impossible to slip. ALGRIP never wears smooth—heavy use only exposes new abrasive particles. The tough rolled steel in ALGRIP makes this floor plate stronger than other abrasive floorings. For safety that pays for itself, get the complete ALGRIP story by writing today for our new Booklet AL-30—without obligation.

At your request, an Alan Wood Steel Company safety engineer will call on you to show you how ALGRIP can be profitably used in your plant to lower insurance rates, raise production, and eliminate accidents.

Over 125 Years of Iron and Steel Making Experience



ALGRIP Abrasive Rolled Steel Floor Plate
ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PA.
Other Products: A. W. SUPER-DIAMOND Floor Plate • Plates • Sheet • Strip (Alloy and Special Grades)

Changing Address ?

- If you are planning to move, please be sure to let our Circulation Department know about it — and as far in advance as possible.
- It takes time to correct the stencil addressing plate and to make the correction on all our records. So your prompt notification will help us make sure you do not miss copies of FACTORY.
- Be sure to give us your OLD address as well as your NEW address. We need them *both* to make the correction.
- Mail in the coupon if you plan to move. And please fill it in as completely as possible.

THANK YOU!

Circulation Dept.
FACTORY Management and Maintenance
330 West 42d St.
New York 36, N. Y.

Change of Address Notice
(PLEASE PRINT)

On or about _____

my NEW address will be . . .

Street _____

City _____ Zone _____

State _____

My OLD address was . . .

Street _____

City _____ Zone _____

State _____

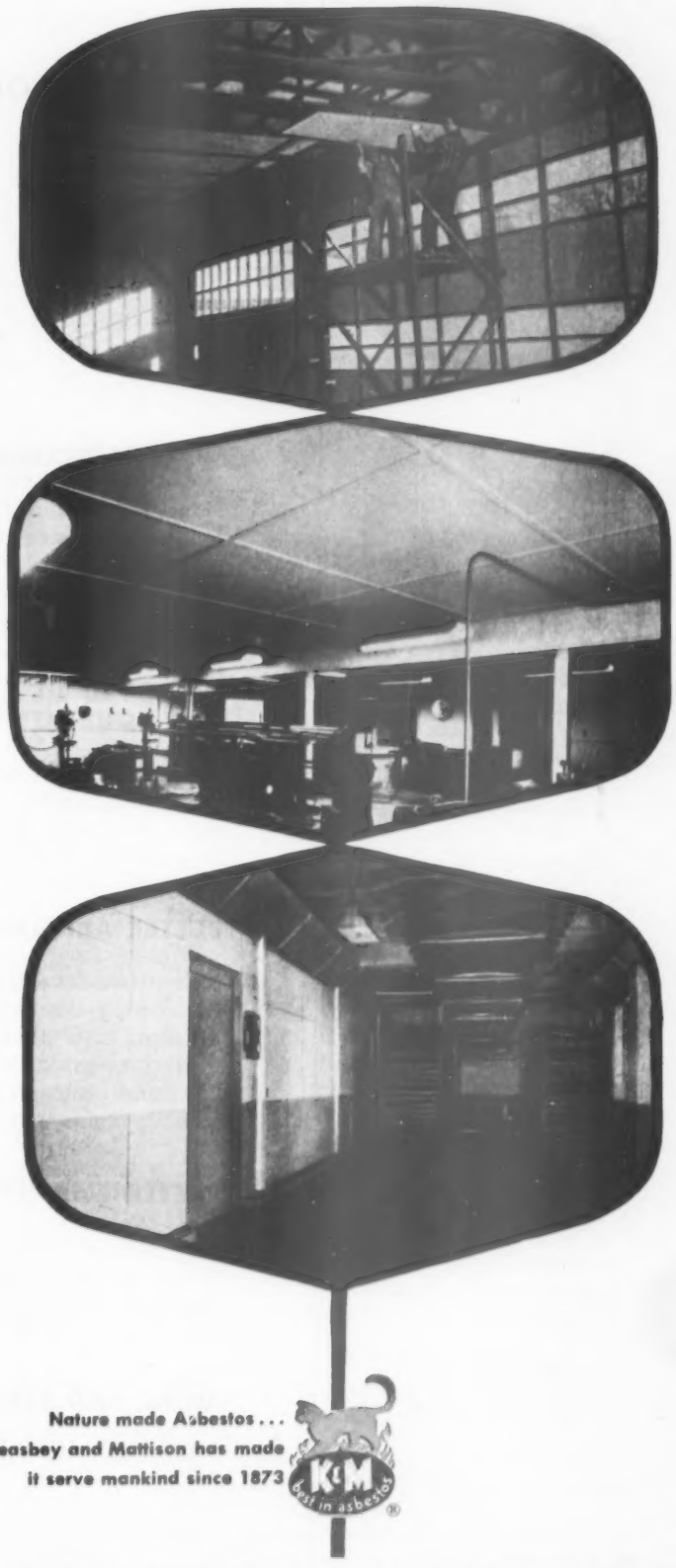
_____
Name Here

INSIDE OR OUTSIDE,
WALLS OR CEILINGS

the smart buy is

"Century" APAC

asbestos-cement sheets



Here's the kind of building economy you can't afford to pass up! "Century" APAC sheets offer you the means to low-cost, trouble-free walls and ceilings on almost any type of building or structure.

These light, easily-handled sheets are made from portland cement and mineral asbestos. They will not burn, rot, or corrode, and they are impervious to insects and vermin. They take decorative colors well, although they never need paint for protection—indoors or out.

Rooms finished with "Century"APAC sheets are clean, attractive places in which to work. Structures sided with this versatile material have a trim, modern, efficient look. Best of all they *stay* that way, for "Century" APAC needs virtually no maintenance—ever!

Your K&M distributor can tell you more about this product and the other types of "Century" asbestos-cement sheets. See him soon! Or write directly to us.

Nature made Asbestos . . .
Keasbey and Mattison has made it serve mankind since 1873

K&M best in asbestos

KEASBEY & MATTISON

COMPANY • AMBLER • PENNSYLVANIA

BETTER PLANTS for today's... and tomorrow's... needs

A report on Trends in . . .

Plant

By CARL G. WYDER • Maintenance Editor, FACTORY

MORE INTELLIGENT ATTENTION TO COSTS

Managements that have built new plants are extremely cost-conscious—considering *all* costs, not just first costs. Frills are going out, but ideas as to what are frills are changing. Flexibility, standardization, and low-cost maintenance get more consideration. Provision is made for expansion. *Page B-80.*

IMPROVED MECHANICAL SERVICES AND EQUIPMENT

The ratio of cost of service equipment to total cost of new plants is going up, to provide better service. Some pipeline sizes increasing. Service lines better located. Better insulation gaining. More packaged service units. *Page B-80.*

BETTER AIR HANDLING

New plants have better air handling systems—including heating, cooling, cleaning, and humidity control. Most plant air conditioning is for process reasons, but the idea of air conditioning for factory-worker comfort is growing. Good ventilation is solving some problems. Principle of maintaining "positive pressure" in plants is gaining rapidly. *Page B-82.*

BETTER EMPLOYEE FACILITIES

The fact that good employee facilities are good business is reflected in improvements—even some "plush," to attract and hold high-type employees. Ideas on location of restrooms shifting. *Page B-85.*

MORE AND BETTER LIGHTING

The trend is not only more light, but better-engineered light.

Services

Foot-candle levels are rising. Arrangements and equipment are making lighting easier on eyes, easier to maintain. *Page B-86.*

BETTER-PLANNED WATER FACILITIES

New plants are paying more attention to supply, conservation, treatment for re-use, and waste disposal. *Page B-87.*

MORE INSTRUMENTATION

Greater use of instruments to measure and control service lines. These include flowmeters, central panels, and safety apparatus. *Page B-88.*

MODERN COMMUNICATIONS

Not as many plants as you'd think are taking advantage of the operating efficiency to be obtained from the most modern communications equipment. But there are some encouraging signs. Industrial TV is beginning to catch on. *Page B-89.*

BETTER PLANT PROTECTION

Better plant protection is a feature of most new factories. Automatic detection equipment is saving money on watchmen. More fences erected. New-type sprinklers available. Heat-resistant paints coming into use. *Page B-89.*

MORE ATTENTION TO AIR POLLUTION

Only the most progressive companies are doing as much as could be done to control wastes from their stacks. Others invite arbitrary laws. Control equipment is available. *Page B-89.*

BETTER PLANT SERVICES are being built into today's new factories for three main reasons:

1. Modern high-production, high-precision equipment demands uninterrupted, top-quality service to operate at efficiencies that will enable them to pay off.

2. Management must find ways to trim maintenance costs as increased mechanization makes the maintenance job larger. Well-engineered service equipment is one of the most important means of getting maintenance-cost control. It is designed to require a minimum of maintenance —and to make maintenance easier and faster when required.

3. Today's good workers in a tight labor market gravitate to the plants with efficient and convenient employee facilities.

On the following pages we have summarized how better plants are meeting these needs.

TURN THE PAGE for more on trends ▶
SIGNIFICANT PLANTS of 1952-53
Duncan Electric Manufacturing Company ... page B-90 ▶
Rotor Tool Company ... page B-94 ▶
QUICK IDEAS for better plant services ... page B-98 ▶
NEW CATALOGS ... page B-108 ▶

Begins on page B-78

10 Trends in... Plant Services

1. More Intelligent Attention to Costs

The dollar sign is more than ever dictating the extent and type of plant services in use in new plants today. This doesn't necessarily mean penny-pinching or doing without. In fact, new-plant owners are more willing today to spend money for plant facilities—like air conditioning, instrumentation, and water treatment—that will pay off in a better-quality product. And for employee facilities that will result in higher productivity, lowered absenteeism, and smaller turnover.

Some clear-cut objectives stand out in this cost-balancing procedure in the design of new plants of 1952-53 and those on the drafting boards for 1954. They are:

FUNCTIONALITY · Gadgets and bric-a-brac are going out. Is the service equipment needed? Does it do the job the best way, at lowest cost? Industry is turning thumbs down on anything that shows up as pure fanciness under this scrutiny.

But ideas as to what is "fanciness" are changing. Cost-conscious managements will spend money now for good cafeterias and lighting such as that they wouldn't even have considered seriously a dozen years ago. But they reject ornate ornamentation today that was standard practice in many plants a generation ago. (Yet they still want—and get—functionally attractive facilities.)

EXPANDABILITY · In line with forecasts and plans you've read about in previous pages for growth of plant structures, management is designing plant services for easy enlargement. Often it is spending a dollar now in oversize services to save more dollars later on.

FLEXIBILITY · Even in single-product plants, you never know when you're going to have to change. Plant owners know that flexibility of plant services keeps down the cost of such a change—may pay out in the very first change.

STANDARDIZATION · The modular design of plant buildings is bringing with it a slower trend to standardization of plant facilities—standardizaton in size, quality, design, layout, and type of plant-service equipment. But such standardization is making headway. It brings lower installation and maintenance costs, lower parts inventory.

LOW-COST MAINTENANCE · Industry is looking today at many new materials and methods to pare down maintenance costs, such as new plastics and protective coatings. Also, new applications of older materials, such as aluminum and stainless steel. Or by better use of equipment, such as special exhaust hoods for fumes to localize and minimize corrosion. Industry is asking architect-engineers of new plants to become more conscious of maintenance costs as they plan new plants.

2. Improved Mechanical Services and Equipment

Industry is spending a higher ratio of its total plant building dollar for plant services than ever before. And it looks as though this ratio will keep climbing. In some cases it is already 50-50. The aim is to cut costs—not by installing fewer plant services, but by using more of them.

Plant-service experts emphasize that basic engineering concepts haven't changed. But plant services have come a long way in refinements. And there's plenty more improvement expected.

More and more, the plant operating executives are being called in to take a hand in plans and specifications for new facilities. They can evaluate the effect of new equipment on the operating dollar. They can justify spending an extra dollar to get long-run economies.

In short, there's a trend to a closer engineering liaison between plant users and plant builders.

Let's examine some of the specific trends reported to FACTORY for improvement of plant services.

SIZING OF PIPELINES · There are varied opinions as to just how far to go in providing for plant growth. Some companies double all pipeline systems over current requirements—steam, water, and air. Several won't oversize steam mains, say the greater heat losses make this uneconomical. One expert contends that raising the steam pressure when demand increases is easier and cheaper. All agree that the steam header should be oversized.

Also, sewer lines and drainage lines are being oversized. You save digging up later to enlarge them, which can be an expensive project.

IDENTIFICATION OF PIPELINES · With the growing complexities of miles of pipelines in a single plant,

their identification is becoming a *must*. Some plants are using a color code—either the American Standards Association's or their own.

At the new National Video plant in Chicago, all overhead lines are painted with aluminum paint and coded with names on adhesive labels.

PROVISION OF EXTRA OUTLETS · Extra outlets in main pipelines are now accepted practice, usually by use of plugged or capped tees. In the National Video plant, such outlets are spaced at 20-ft. intervals for air, gas, and vacuum mains that run down the center of the building. Sewer mains have outlets every 60 feet.

LOCATION OF SERVICE LINES · At least four out of five single-story, no-basement plants are placing plant pipelines (except sewer lines) overhead in truss or ceiling sections. One nationally prominent architect-engineer points out: "You can get at the overhead lines more easily, particularly with the modern portable platforms." Other good reasons are: (1) You save valuable floor space; (2) you avoid expensive reinforced tunnels if you have heavy floor loads; (3) overhead lines are easier to install than those in trenches—and trenches cost extra money to drain; (4) laterals don't interfere with machinery, and *vice versa*.

But in certain circumstances a grid of underground trenches is sometimes favored—when the process layout is fixed or the machinery is concentrated.

In the new addition to the Piasecki Helicopter plant at Morton, Pa., engineers felt both systems have merit. They have run all steam, gas, electric, and water lines in the trusses to conserve production space. But compressed air and electric power are distributed to a 360x400-ft. machine area through an under-the-floor trench system radiating from each of six interior columns.

For single-story buildings with basements, opinions as to whether to run services above or below are sharply divided. Basement services, it is claimed, are cheaper to install because of shorter risers, and are easier to maintain than overhead runs. The plant has a cleaner appearance, and there is adequate flexibility—thus runs the argument of those who favor this method.

But, should machine layout changes be frequent, says one plant engineer, under-floor changes will still be costly. Yet provision of sufficient hangers for overhead runs is costly, too. His plant solved the problem by using pipe stanchions, about 8 feet high, with a cross-arm on top like a telegraph pole. The stanchions can easily be shifted. Service lines are attached to the horizontal cross-arm and the vertical pipe column as needed.

COMPRESSED AIR · More pneumatic operations in today's plants are requiring clean, dry, compressed air with steady pressure—for tools, air cylinders, process applications, spray painting, air controls, and so on. They invariably call for an after-cooler at the compressor, and added separators or filters for moisture and oil at the use points.

One architect-engineer is saving his clients money when any apparatus in the plant requires higher than the normal 100-psi. pressure. He provides a booster at that location, thus avoiding the cost of operating an over-all high-pressure main with reducing valves. Similar economies are being obtained where low-pressure operations exist, such as air agitation of electroplating solutions, or ejection of metal stampings from punch presses. In this case a low-pressure system with a centrifugal compressor—up to 9 psi.—will cut the cost of air from 12¢-25¢ per 1000 cubic feet at 100 psi. to 1¢-3¢ per 1000 cubic feet at low pressure.

Plant engineers are looking more closely at operating costs in designing compressed-air systems. There's a tendency to install two or more smaller units instead of one large unit, to handle off-time loads. Also, you have at least partial standby if one unit needs repair or overhaul. At Norden Instruments, the outlets of compressed air lines are equipped with quick-detachable couplings. Purpose is to save air and permit fast changes of worn air hoses to the tool.

PROCESS GASES AND LIQUIDS · Increased use of gases for processing—oxygen, nitrogen, hydrogen, and the like—are justifying the installation of gas-generating equipment right at the plant. Or gases are delivered in bulk and piped directly into the plant. At the new Hytron Radio plant, gases are fed from trailer trucks and from "bottles" in a rear storage room. Ammonia is piped from a railroad tank car to an underground storage tank.

With better materials for storage and handling available—protective coatings, pipe, and fittings—more bulk purchases of chemical liquids for processing are being made. There's a trend to centralized tank farms and metered pipelines to serve all parts of a plant using these liquids in their operations.

THERMAL INSULATION · The greater use of fluids at higher temperatures and pressures in processes is justifying the cost of better insulation of hot vessels and pipelines. Close control of process temperatures adds to the need.

Likewise, the expanding use of refrigeration in processes and air conditioning calls for better sweatproof insulation of cold pipelines and covering of air ducts.

The trend toward more outdoor lines requires protection from weather and freezing.

And industry is paying more attention to insulation of hot equipment to improve workers' comfort and safety.

As a result, many plant maintenance departments now keep one or more full-time pipe coverers on their crews.

Industry is searching for cheaper ways to install

thermal insulation and extend its life. New methods and tools are helping to reduce the cost.

Stud welders provide anchors for easier and faster covering of smooth surfaces. Some plants are using light-gage aluminum shields to protect inner pipe covering from damage. New resin sealing coatings permit pasting of canvas covering instead of the more expensive sewing. Better membrane coatings and sealers are providing more rugged moisture barriers.

CENTRALIZED BUILT-IN SYSTEMS · In many cases, engineers are finding that centralization of plant service equipment is paying off. It may be on a plantwide or departmental basis.

Cost of operation and maintenance of plant services largely determines whether to centralize or decentralize.

For example, in the plant modernization program at Standard Pressed Steel, Jenkintown, Pa., an underground, completely automatic system provides clean coolant to a battery of 60 centerless grinders. This recirculating system cleans and aerates machine-tool coolant. It doesn't occupy any valuable floor space, and it eliminates the need to service each machine.

Some plant cleaning and housekeeping services are profiting from built-in design. Food plants have used centrally piped vacuum-cleaning systems for some time. Now other plants are adopting the practice, particularly where high-suction exhaust systems are not feasible to recover valuable, toxic or messy dusts.

At the new Fisher Body Division of GMC, Grand Rapids, Mich., a built-in underground conveyor system is handling all stamping scrap disposal. Main line of this system runs lengthwise through the center of the plant. Laterals extend under a series of parallel press lines to both sides of the plant. Steel scrap drops from the presses into chutes leading to the laterals, then flows onto the main conveyor to two baling presses at the end of the plant. Bales ride directly to rail cars.

There are plenty of valid exceptions to centralized services, usually where service needs are few and scattered.

Hot water generators are an example. Package units of the storage type supply hot water at the new Daystrom plant (Archbold, Pa.) for large cafeteria and plating requirements. For its smaller, intermittent washroom needs Daystrom uses instantaneous electric hot-water heaters.

3. Better Air Handling

Without exception, the experts interviewed by FACTORY editors agree that good air handling is a "must" in the modern plant. The only question is: How good?

Two factors control this decision: (1) product quality, and (2) employee productivity or welfare. As one architect-engineer put it: "If it saves a buck, they'll install it!"

To keep the cost of their products competitive, more plant managements are finding they must at least consider air conditioning if they are to compete in the labor market for good workers. Air conditioning is attracting into plants people who wouldn't otherwise work there.

Further, good air handling systems are paying off, in part, in longer life of plant facilities, and lower maintenance. Elimination of dust and fumes minimizes the plant cleaning and housekeeping operations, removes common causes of abrasion and corrosion.

Here are bits of advice we got that sum up the trend in air handling:

"Don't design any major building from now on without provision for full air conditioning."

"Build your air system for the future. It costs money to expand it. But balance initial cost against later savings."

Air Conditioning

MANUFACTURING AREAS · Where processes demand it, manufacturing areas are being air-conditioned.

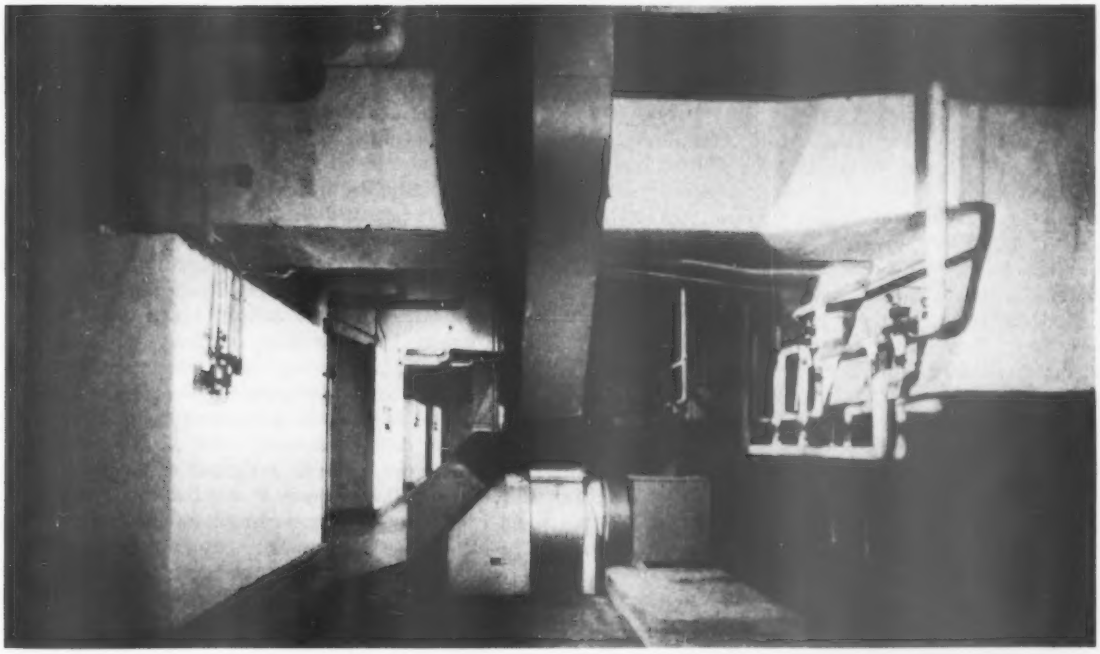
Few manufacturing areas are air-conditioned solely for worker comfort. But the number is growing and the idea is getting more serious consideration all the time. When faced with the costs, most managements as yet can't see enough gain in productivity to justify $2.50 to $3.50 per square foot extra. Not when they can get good ventilation for 60 cents. But this reluctance is wavering in the warmer summer climates of the South and Southwest.

Some plants have compromised. They install air handling facilities that can be easily changed over to complete air conditioning. In its new plant at Metuchen, N. J., Westinghouse Electric provided a fresh-air system on two platforms in the trusses with blowers, filters, and heating coils. It left space for cooling coils and centralized refrigeration equipment in case temperatures and humidity controls are needed later.

OFFICE AREAS · Many new plants are air-conditioning these areas, including drafting rooms. And some are extending it to locker rooms, restrooms, and cafeterias.

Because of greater manpower density in offices than in manufacturing areas, air conditioning in offices affects more people per dollar spent. Also, it permits you to utilize space that would otherwise be undesirable, such as basements or mezzanines, for office workers.

If you have a limited budget, one engineer suggests first use of air conditioning in the cafeteria.



AIR HANDLING EQUIPMENT in Sheaffer Pen Company's new plant is in a 48x144-ft. penthouse. Left, some of the built-up and package-type air-conditioning systems serving 25 individually controlled zones. Center, fans and exhaust ducts.

The Atlanta Envelope Company has carried this idea further in the design of a "split" system. For 1½ hours at lunchtime, conditioned air from the office area is bled into the cafeteria. This saves a 20-ton capacity with little loss in utility.

DESIGN FEATURES • Choice of equipment—between centralized or packaged units—seems to depend on the size and nature of each application.

Small areas are using packaged units effectively in office, storage, and manufacturing locations where processes don't require made-up air. When many packaged units are needed, initial costs and maintenance may run higher than for a single central unit. On the other hand, if one unit fails, you still have the others. And you can shift packaged units more easily.

An unusual development of the packaged unit is the crane-cab cooler. At the Cleveland Works of Jones & Laughlin, a cooler keeps the summer temperature inside the cab down to 80-85 F. Some plants are using packaged dehumidifier units in processing or storage areas that need only humidity control. They protect stocks against rust or mildew.

As to placement, the tendency is growing to put large air-conditioning equipment (also ventilating and exhaust fan rooms) in penthouse structures. At Goodyear Tire's textile plant in Cartersville, Ga., Wigton-Abbott Corporation placed decentralized air-conditioning equipment in six penthouses. This reduced the length of piping needed, reduced cost by keeping equipment out of the manufacturing space, and met requirements of two different humidity zones.

For ductwork, galvanized sheets are giving way to new materials — aluminum, asbestos, and even plastics and stainless steel.

HEAT LOAD • More attention is being given to ways to minimize the heat load in air-conditioned areas. This cuts the cost of original equipment.

Good roof and building insulation is the most widely used method. There are some supplementary ways. The new Norden Instrument plant at Milford, Conn., has decided to cut sun-ray heat by use of aluminum shade screens. Clare Manufacturing in Chicago is using lower suspended ceilings to cut cubical demand. Use of water spray on roofs (with or without air conditioning) is increasing where water supply is not critical.

Ventilation

The trend is mostly mechanically exhausted air. The latest systems circulate cool air in summer, add heat to it in colder weather.

Complete air changes in 5 to 10 minutes in large areas are not unusual. At the Hytron Radio & Electronics plant, Danvers, Mass., a continuous roof ventilation system handles 400,000 cfm. at a low velocity for a complete air change every 2 minutes.

Invariably, engineers are gearing over-all plant ventilating systems to coordinate with special paint or dust exhaust systems, so as to retain the latter's

efficiency. More and more plants are switching to "positive pressure" systems which maintain a pressure inside the building of 1 to 2 inches of water. This pressure reduces the infiltration of warm air or cold drafts.

Ingenious ways have been used to remove heat in hot process areas. In the Hytron plant one sidewall of the hot "stem" department is honeycombed with openings to provide low-velocity, draft-free air. At the new Sylvania Electric plant in Burlington, Iowa, the tube processing racks, which radiate a lot of heat, have been put on an expanded-metal floor; there are powered ventilators overhead. This induces a flow of cooling air up through the racks and out the ventilators.

Dust, Fume, and Odor Control

State laws and local codes on the one side, and good public relations on the other, are pressing for good control of nuisance or unhealthful dusts, fumes, or odors—both inside and outside the plant.

Foundries and steel plants, for example, are better workplaces today. At the new open hearth department of Inland Steel Company at Indiana Harbor, Ind., the building was constructed with side openings much lower than is conventional. This design provides a maximum vertical updraft to carry away smoke and dirt from the floor.

Recovery of byproducts is another factor, sometimes even more potent and persuasive, for screening of dusts and fumes. Dust collectors, air filters, electrostatic precipitators, catalytic chambers, and fume scrubbers are paying their way.

Centralized systems are usually installed where conditions are plantwide. For small departmental or isolated exposures, unit or portable systems are favored. Severe dust or fume exposures are being isolated in special rooms or are completely enclosed in specially built chambers located on a wide-open production floor.

The principle of the "pressurized" plant for ventilation is also being applied to control of dust and fumes. A slight positive pressure will keep dust from leaking through uncontrollable openings into precision operations. Solar Aircraft Company is building a new dustproof factory at San Diego for making small, high-precision gas turbines. A forced, filtered air system is to be used.

Space Heating

MANUFACTURING AREA · Unit heaters are by far the most popular source of heat in plants where air is not conditioned and distributed by ductwork. They lend themselves to thermostatic control for each area. They can be mounted so they protect employees near door openings with a curtain of hot air.

Makers of unit heaters are perfecting design of their products to project large volumes of diffused warm air which won't blast workers off their feet. Or you can vary the diffusion pattern to suit the area. Heaters are being both floor- and overhead-mounted. Output capacities run as high as 2-million Btu. per hour, and over.

Some plants are spotting large heat generators around the plant; they supply warmed outside make-up air to each area through distribution ducts. In summer they circulate fresh air.

The choice in unit heaters lies mainly between the self-contained, direct-fired type (oil or gas fuel) and the "central station" type which gets its heat from a central source. Each has its points. Direct-fired units show definite economies for isolated areas, because they eliminate long mains, traps, valves, and so on.

Whether or not you need high-pressure process heat has until recently influenced the choice. Also the size of your heat load.

But now the modern packaged steam generator has entered the picture. It can supply both low- and high-pressure steam in reasonable quantities. The new Daystrom Instrument Division plant in Archbold, Pa., is a case in point. It has one packaged boiler for a small process heat load at 100 psi. and three boiler units for a large space-heating load at 15 psi.

Many engineers favor the central heat source when you have to heat offices and cafeterias as well. Yet the new Rand-McNally plant in Skokie, Ill., has chosen central heat only for its offices and those work areas which are air conditioned. It uses direct-fired unit heaters for the rest of the shop. It says this design allows for easy addition of unit heaters for plant expansion without the need of extra capacity in the central heating system.

Another type of central heat source coming up is the high-pressure hot water system. Long accepted in Europe because of its economies of operation, it has advantages in lower heat losses and less maintenance where long distribution lines are involved. And it lends itself to use for process heat in dryers, hot-water heaters, and the like.

Industry is examining the problem of heat loss in exhausted air. One large auto manufacturer contends it costs more to heat fresh make-up air for spray booths than to heat the rest of the plant. Some plant heating systems are cutting the heating bill by re-use of exhausted warm air after washing and filtering it, and removing odors by activated carbon filters or catalytic combustion units.

OFFICE AREAS · Hot-water baseboard radiation or steam radiators seem to prevail in office spaces that are not air-conditioned. A few use ceiling-type radiant heat panels with hot-water coils.

But here also the unit heater is intruding, where conditions justify. In the office and engineering areas of the new Luscombe Aircraft plant in Garland, Texas, employees are kept comfortable by a combination of two 11-ton units for summer cooling and four 65,000-Btu. forced-air units for winter heating.

4. Better Employee Facilities

The minimum standard in employee facilities in new plants today was the maximum 10 years ago.

One architect-engineer sums up the trend this way: "Industry will spend all kinds of money for employee comfort, convenience, and recreation."

New-plant owners and designers agree that the basic reason why industry now goes for better employee facilities is that they improve worker efficiency. The motive is good business, not altruistic.

Some plants are providing extra conveniences—TV and radio lounges, smoking rooms—to compensate for other inconveniences like longer travel time, or to reduce labor turnover. They are planning larger and better facilities—gatehouse time clocks, cafeterias, restrooms—to eliminate griping about time lost in queueing up.

The grade of facilities in new plants ranges from purely utilitarian to highly attractive and decorative. A few plants are going in for "plush," where they want to attract and hold the type of worker who appreciates it.

EMPLOYEE FACILITIES at Saco-Lowell's new Edwards plant are in enclosed islands in each of four quadrants. Concrete mezzanine slab holds supervisory desks and substations.

SANITARY FACILITIES · Since most new plants are single-story, a big question today is: Where is it best to locate employee sanitary facilities—washrooms, toilets, locker rooms, restrooms?

Facilities on the main floor are apt to interfere with changes in layout. But, if you put them underground, sooner or later you may face trouble with excessive main-floor loads. If they're overhead, employees complain about stairs and take longer time out from work.

For the last few years the trend has been toward location overhead, either on a mezzanine or a second-story monitor. Today this trend is wavering. One design engineer points to the fact that roof trusses are becoming too light for such loading. Another notes that it's cheaper to excavate than to reinforce overhead structures.

A review of many new plants shows no clear trend. Here are some highlights from several plants:

Delco, Dayton—Toilets are on the main floor in the middle of four quadrants of the plant.

Sylvania Electric Products, Woburn, Mass.—All locker rooms and employee services are in basement, so as not to interfere with operations. Machine shop also is there.

Ford's Kansas City Aircraft Plant—All employee facilities (including kitchen and cafeteria) and some production offices are in a basement area beneath the manufacturing assembly area.

Rheem Manufacturing, Nutley, N. J.—Has a mezzanine bridge, 50 feet wide, that extends the length of the plant and holds employee facilities. Employees enter plant from parking space at north end of mezzanine and descend to manufacturing floor.

Western Automatic Machine Screw, Elyria, Ohio—All lockers, washrooms, and restrooms are in a roof monitor. Space in monitor will house future cafeteria.

Link-Belt, Colmar, Pa.—Lavatory, toilet, and locker rooms are located on mezzanine above shop offices.

A-C Spark Plug, Flint, Mich.—Toilets on main floor are movable, to facilitate layout changes. Drainage system is designed with extra outlets.

SOME DESIGN HIGHLIGHTS · New plants are aiming to cut the labor costs of sanitation crews by designing easier-to-clean facilities. Industry is finding it cheaper to pay more in first cost to cut expenses of years of maintenance.

Glazed tile walls are widely used in washrooms and toilets. Terrazzo or ceramic tile floors are popular in wash-up areas. Other features used in new plants are wall-hung closets and fixtures, and ceiling-hung partitions. They simplify floor mopping operations. One plant engineer prefers floor-type urinals, however, on the basis of cleanliness.

Both Delco and Piasecki have tackled the problem of the effect of a possible wartime change in the male-female employee ratio on sanitary facilities. They have installed "floating" partitions that separate men's and women's facilities.

In the new Cutler-Hammer addition in Milwaukee, exhaust fans change the air in locker rooms every few minutes to eliminate odor.

PLANT FEEDING · Despite dour predictions at the close of World War II that plant cafeterias wouldn't stay, they have.

Almost all new large plants include lunch or cafeteria facilities. Even some smaller plants—as low as 100-150 employees—are now providing them. One reason: New suburban plants often are without nearby public eating places, and allow too little time for employees to go home.

Turn the page

MERCURY LAMPS LIGHT PRESS SHOP, with incandescents for stand-by service. It's at Chrysler's New Castle (Ind.) plant, where 60 1000-watt mercury lamps, 39 feet up, furnish 53 foot-candles at floor level. There are also 20 reflector-type 1000-watt incandescents that come on in case a voltage dip causes the mercury lamps to go out. It takes 5 minutes to get the mercury lamps lighted again. Meanwhile, the incandescents provide enough light for safe operation.

5. More and Better Lighting

Higher lighting levels are a continuing trend. Where 35 foot-candles used to be considered tops a few years ago, plant buyers now seek 50, 60, even 90 foot-candles at working height for close work. And they want it without glare or shadow.

Only two or three years ago, most plants were considered well lighted if a lot of lighting was provided on the working surfaces. First cost was held down severely—usually to what was left over after all other building details had been considered. The engineer then bought the greatest *quantity* of light he could get for his money.

Today's trend is toward *comfort and efficiency* —not just quantity—in lighting for plants and in offices. Uniform light levels are maintained throughout the plant, with no dark spots adjacent to bright spots. Ceilings, for example, aren't left as areas of darkness. At Norton's new grinding machine plant in Worcester (Mass.), 20% of the light is thrown up to the ceiling.

IN MANUFACTURING AREAS · Good lighting levels have to take into consideration the task, degree of visibility required, and environment in the plant itself. Comfort lighting involves consideration of source of light, color of light, color of machinery and walls in the area, and types of reflectors.

New plants are basing their purchase of better lighting on two main facts:

- **It takes time to see.** The eyes, like the camera, need more time for seeing under poor light than under good light. So good lighting enables workmen to use their time on the job instead of wasting it in trying to see what they are doing.
- **It takes energy to see.** Workmen gradually tire from eye strain and this affects their productive output. Some plants are using controlled lighting to increase the light levels as the hours go by—helping to compensate for reduction in production due to fatigue.

A well-lighted plant usually means a well-kept plant. One chemical plant in Boston paid for its whole lighting program in the savings brought about by reducing leakage of liquid from pumps. This liquid in the old plant often went unnoticed and ran over the floors. In the poor light, nobody paid much attention to it. When the new plant was put up, the good lighting showed up these bad operating habits in a hurry.

Light sources are constantly being improved. Lamps burn longer and stay brighter longer, and new types of lamps are catching on. The use of

mercury lamps for high-bay installations is increasing because of color correction that removes much of the harsh, cold light. It is no longer necessary to use supplemental incandescent lamps for color effect. A new tank plant in Delaware uses over 5000 of the new mercury lamps.

The slim-line fluorescent lamps in the 8-ft. size lend themselves to continuous-strip lighting, which is gaining in use. This type of lighting throws a minimum of shadows.

But new-plant builders aren't ruling out incandescent lamps. You see lots of them in new factories. By using prismatic mirrored glass and aluminum reflectors you can get good lighting distribution, especially if the mounting is quite high. Incandescent lamps are used most extensively for spot or concentrated-area lighting.

OFFICE LIGHTING · The big trend in office lighting is to increase lighting levels, but get away from glare. It's tougher than in manufacturing areas, because ceiling heights are lower, and seeing tasks are usually more acute. Most new plants are guarding against direct glare by providing louvers or similar shielding in fixtures.

As light levels go up in offices and engineering rooms, they are going up in reception rooms and corridors. Brightly lighted offices and dim corridors don't mix. The contrast is too great. People find a brightly lit office uncomfortable when coming in from a dim corridor, or feel as if they're going out into the darkness when they step into the corridors from the office.

Color in the lamp source, once considered a luxury, is being used more and more—at little extra cost. Fluorescent lamps of the de-luxe type are available to make all office personnel look as if they had just returned from a vacation in Florida. And quite a few offices are now using fluorescent sunlamps over the entire area. These lamps produce, in an 8-hour day, the tanning equivalent of 15 minutes of summer sun.

Another trend is to the use of luminous ceilings. In this type of lighting, a grid of fluorescent tubes is hung from the ceiling. Underneath the tubes are hung panels of diffusing, transparent material which make the outline of the lamp sources invisible. The result is glowing panels that deliver soft light over the entire room. Light intensities of 90 to 100 foot-candles are produced without any glare, either direct or indirect.

MAINTENANCE · The cost of lighting maintenance is really determined long before the lighting is installed. Many new-plant buyers are realizing that design of fixtures is of first importance.

Dirty reflectors rob you of lighting lumens that you are buying from the power company. But it's costly to wash reflectors, especially in high bays. Fixture manufacturers have found that, by putting slots in the reflectors, you can extend the period between cleanings to three or four times the frequency of those that are not slotted. There are special fixtures for high-bay lighting that are designed with ventilating louvres in sections, so that the dirt-laden air will pass through the reflector instead of being trapped inside the "hood" and eventually deposited on the surface of the reflector. We have seen them in the better new plants—such as Delco's in Dayton.

6. Better-Planned Water Facilities

Industry is getting more water-conscious. There's hardly a new plant that isn't designing facilities for good supply and disposal systems big enough for years to come. They are no longer an afterthought.

WATER SUPPLY · The trend to suburban or isolated plants, architect-engineers report, is requiring more careful surveys of ground-water supplies and forecasts of future needs. Industry is finding it wise to collaborate with community water plants in a study of the problem, and in sizing of supply mains and disposal sewers. Many plants are building reservoirs for storage of clean waste water and rain water.

More plants think it advisable to call in geological experts for preliminary advice, particularly in location of wells for secondary supply. Already some companies are finding to their sorrow that well-water flow has dropped to a trickle, because of industrial congestion and lowered water tables.

Some companies are going so far as to check well and ground-water temperatures before deciding on a plant location, to avoid expensive cooling equipment.

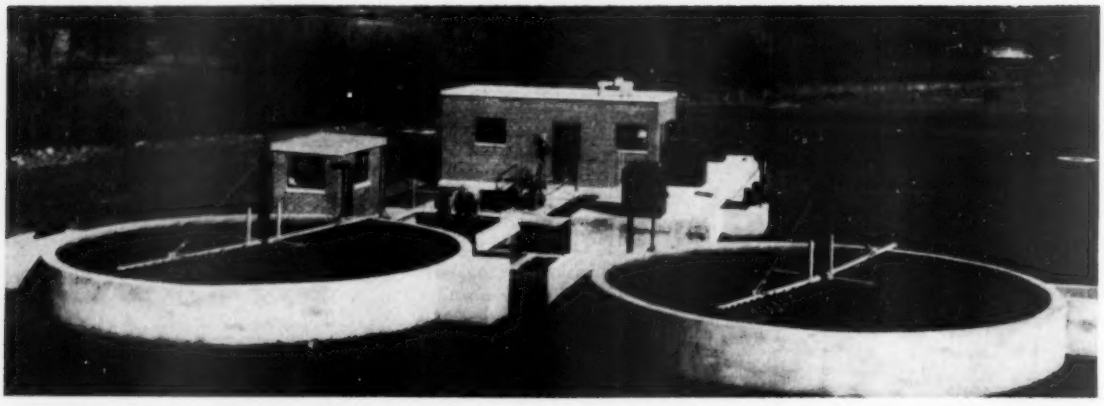
WATER CONDITIONING · Many plants now require pre-treatment of water—by filters, water softeners, demineralizers, etc.—to get clean or soft or distilled process water. Chlorination units are often needed for potable supplies. In the new Westinghouse plant at Elmira, N. Y., a conditioning plant softens and purifies 180,000 gph. of process water from two wells. City water is used in the sanitary system.

Some plants are going in for chemical treatments and deaeration to help cut corrosion and clogging of pipelines and equipment.

Best policy, says one design engineer, is to analyze the supply to find out what water conditioning equipment is justified, both for processing and for lower maintenance.

WATER TREATMENT · Three big reasons are accelerating industry's interest in treatment of waste water:

Turn the page



SEWAGE TREATMENT PLANT AT COLMAR (PA.) PLANT OF LINK-BELT COMPANY HANDLES SANITARY WASTE.

1. There are fewer and fewer places where you can legally dump obnoxious waste water.

2. The cost of "new" water is often so high it's cheaper to reuse waste water than to throw it away.

3. Recovery of some wastes makes reclaiming equipment profitable. Industries using lots of process wash water are discovering new and better ways to reclaim valuable waste byproducts.

At the new American Thread plant (Sevier, N. C.), a caustic evaporator unit recovers caustic soda that is washed out of cotton yarn in the mercerizing process. It concentrates the wash water, containing 6.5% caustic soda, to 40% strength for re-use in the process. Operating and maintenance costs are low. The savings run to many thousands of dollars per year. About 90% of the heat supplied to the unit is recovered as hot water, which is reused in the process water system.

Standard Pressed Steel at Jenkintown, Pa., has just spent $153,000 for a new treatment plant for plating wastes. It processes chromic acids, cyanides, metallic plating solutions, and quenching oils—yet using the new treatment plant it can discharge a clear, harmless effluent into the community stream.

Sewage treatment is becoming a job for suburban plants lacking sanitary sewer connections. A new biochemical treatment, requiring less than usual equipment, promises to cut costs of capital outlay.

WATER SAVING · Designers and engineers of today's new plants are turning to equipment or methods that will save water. This is a definite trend.

Two main types of equipment are symbolizing this effort—equipment to cut water consumption, and to reuse water. In the first group are items such as thermostatic valves to control water flow, and meters to check consumption.

· In general, cooling water is easy to re-use. Reuse of process and sanitary water is more costly and difficult. Yet it has been done, even in extreme cases, as evidenced by treatment of Baltimore city sewage waste and reuse of the water for cooling at the Bethlehem Steel plant.

Plant engineers are tending to keep process and sanitary wastes separate. Sometimes they even keep different grades of process waste separated. This saves money in determining the size of the waste-treatment or recovery plants; some wastes don't need any treatment at all.

7. More Instrumentation

Opinions on the type, location, and best use of instrumentation in plant services vary. But there's no doubt of this in most minds: **More instrumentation is coming.**

We are defining this trend in a broad sense—control, recording, and measuring instruments for humidity, temperature, pressure, volume, weight, quantity, chemical analysis, viscosity, liquid level, and so on—as applied only to plant services.

Here are some examples of growing uses:

1. Flowmeters. Used to meter consumption of steam in each department, to get more reliable cost figures on whether specific operations are making or losing money. The same principle will apply to water, light, power, gas.

2. Central panels. Used to check an control operating status of plant-service equipment for air conditioning, compressors, pumps, electrical equipment, heat exchangers, sewage plant, and so on. Purpose is to minimize size of operating crew by cutting down on walking.

3. Safety apparatus. Used to sound alarm or cut off power when operations exceed safe limits for workers or machines. Explosive gas analyzers, pH meters, and bearing-temperature indicators are typical applications.

8. Modern Communications

Industry is slower than it should be in accepting modern aids, other than the telephone, in plant communications. This is the opinion of the majority of people we interviewed.

There are two exceptions—the call system and the public address system. Practically all new plants of any size are adopting one or both. And with PA many are including music, shift-start-and-stop signals, fire signals, and other messages.

Relatively few plants are making best use of the "intercom" system, particularly as a solid connection between two or more operating points. They don't realize how much supervisory walking and unnecessary traffic it can save. There are notable exceptions. In one paper mill we know of, an intercom bridging the ends of a 250-ft. paper machine is achieving close quality control. Voice-powered telephones fit in here, too.

Industrial television (closed-circuit ITV) is beginning to catch on to solve special problems. But its wide observational possibilities have not yet been grasped. As yet architect-engineers have had few calls to design ITV into executive- or production-office layouts.

They see every reason for an upsurge in use of ITV and other modern communication techniques, but don't know when it will come. Among these are the telescriber, electric typewriter, and pneumatic tube systems.

A combination of telescriber and pneumatic tube is making work easier at the new Inland Steel open hearth operation. They connect each furnace with the metallurgical laboratory in another building. Test samples from each heat of steel are whizzed back and forth by tube. The telescriber sets down analyses in writing for permanent record.

9. Better Plant Protection

The need for complete protection of a plant and its people against fire, explosion, theft and sabotage is now commonly accepted.

Most new plants are being fenced in. Big problem today is to maintain plant security at lowest cost—and to keep down the guard payroll. At the Norton Company's new Worcester (Mass.) plant, the fence and door layout is so designed that complete control of the plant is possible by only two guards at any time. Many plants are fencing in their employee parking lots.

New plants are turning more and more to automatic signaling and protective equipment. This cuts the bill for watchmen, and minimizes the chances of human error where it can mean a catastrophe.

For example, automatic fire detection and smoke detection systems are supervised by one man at a central station control panel. Audible alarms warn of trouble. Fire pumps start automatically in the boiler house when a sprinkler goes off. Emergency lighting takes over instantly when power lines fail. Air conditioning systems shut themselves down under electric-eye control when smoke gets into the duct-work. Built-in fire extinguishing systems snuff out flash fires before they can spread in processes or electrical equipment.

Here are some recent improvements in traditional concepts of plant protection:

- New types of sprinklers promise water-spread over larger areas with less water.
- Fire-hose racks in flush-wall, glass-covered panels are simplifying the plant cleaning operation and keeping the hose safe and clean.
- Television is expected to reduce patrol duties by a centralized scanning set-up.
- Heat-resistant paints are giving extra protection to steel and wood structural members and process equipment exposed to high heat.

10. More Attention to Air Pollution

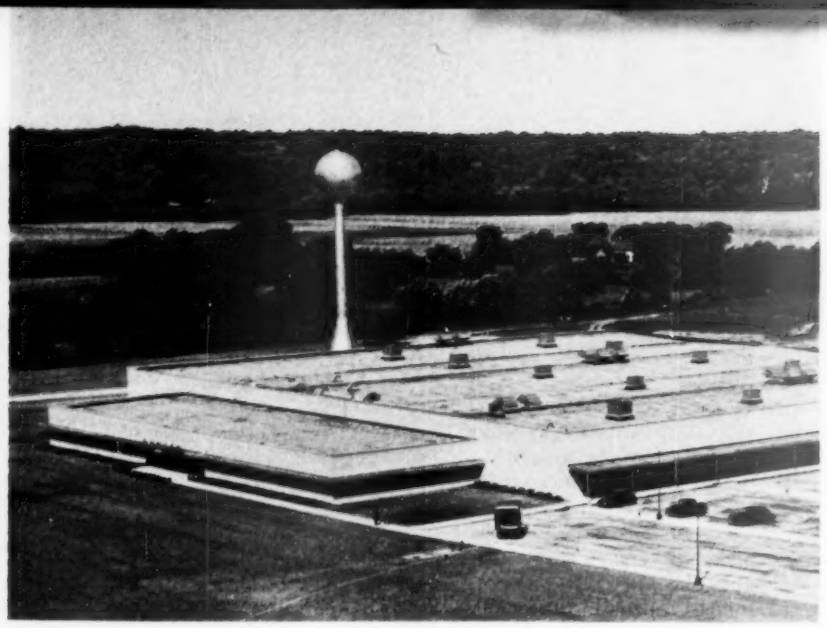
Industry is becoming increasingly aware of the consequences of air pollution from its stacks. Perhaps not as fast as it should.

As with pollution of streams by water wastes, the incentive for control of smoke, fumes, odors, and dust is partly social and partly economic. What a community thinks of a plant that blankets it with flying ash, paint spray, or chemical smog has much to do with the type of employee it can get and his health and attitudes. Up to now, these intangible reasons for air-pollution control have been harder for industry to see than the corrective installation which pays for itself out of recovery of byproducts or elimination of corrosion of plant structures.

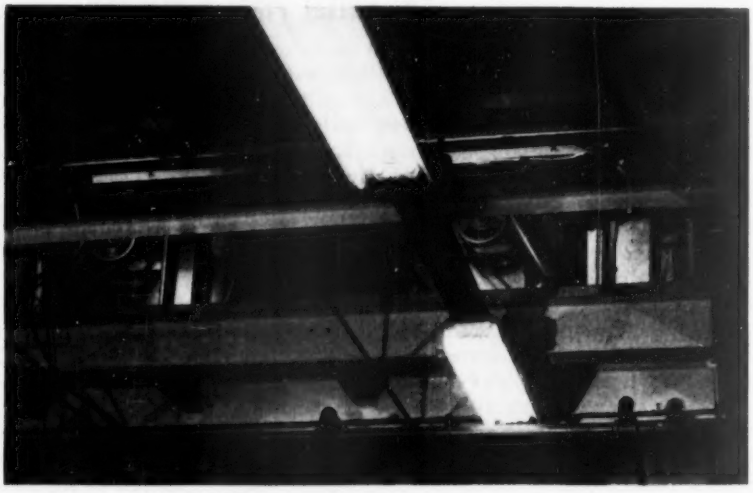
The equipment for control of most kinds of air pollution is available—combustion controls, electrostatic precipitators, washable filters, oil filters, fume scrubbers, deodorizers, and many kinds of dust separators. Big question today is not one of plant engineering, but of justification of the cost of anti-pollution equipment.

Some large companies such as General Motors and DuPont are on record that none of their plants shall contaminate streams or the air. New plants of some progressive small companies are built to prevent air pollution. Their owners are not waiting for others to set up arbitrary anti-pollution codes. They are trying to guide adoption of practicable regulations.

BETTER PLANTS for today's... and tomorrow's... needs



MODERN IS THE WORD for Duncan Electric Mfg. Company's new plant. It has most of the features dictated by today's design concepts. Situated on 38 acres of Wabash River



TRUSSES HOLD EQUIPMENT for conditioning air in the entire plant. Equipment was first assembled on platforms, then raised to position shown. Cooling water comes from wells.

Built for Employee Comfort

A SIGNIFICANT PLANT OF 1952-53

NAME: Duncan Electric Mfg. Co.
LOCATION: Lafayette, Ind.

PRODUCT: Watt-hour meters
EMPLOYEES: 550

DESIGNER, ENGINEER, & BUILDER: The Austin Co., Cleveland

NOT PLUSHY, BUT MIGHTY NICE, will be your reaction to Duncan Electric's new plant as you study these four pages. That's because this plant was designed for top employee comfort—yet with an eye to economy of operation and maintenance.

Naturally, the need for more efficient production facilities is what really causes companies to build new plants. But this plant demonstrates that this need and its co-objective—employee comfort—are quite harmonious. Here are some examples:

bottom land near Lafayette, Ind., this air conditioned plant is flexible, expandable, efficient, and comfortable to work in.

ALUMINUM EYEBROW shades glass-walled entrance from sun. A similar eave protects the small office windows.

CLEANLINESS IS ESSENTIAL to manufacture of watt-hour meters. So concrete floor is surfaced with asphalt tile to eliminate dusting. Present 30 foot-candles of general illumination can be doubled by adding fixtures in spaces in runs.

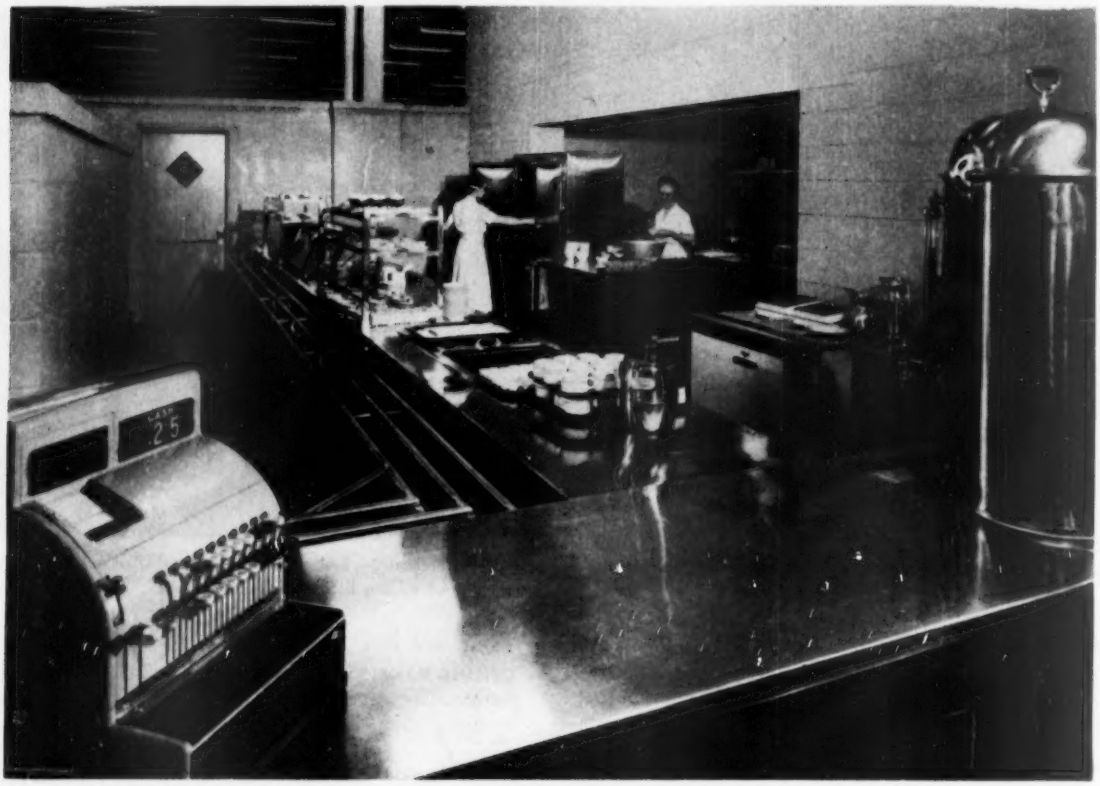
AIR CONDITIONING simplifies plant and employee cleanliness. Duncan's system provides fresh outside air, cleaned and cooled, at the rate of 100 cubic feet per minute per employee. Humidity is kept low, and on warm days, inside temperature is 15 degrees below outside temperature. In winter, the air is cleaned and warmed.

CEILING PANELS are rubber-coated glass fiber. While designed primarily to cut roof heat load, they also improve shop conditions by reducing noise.

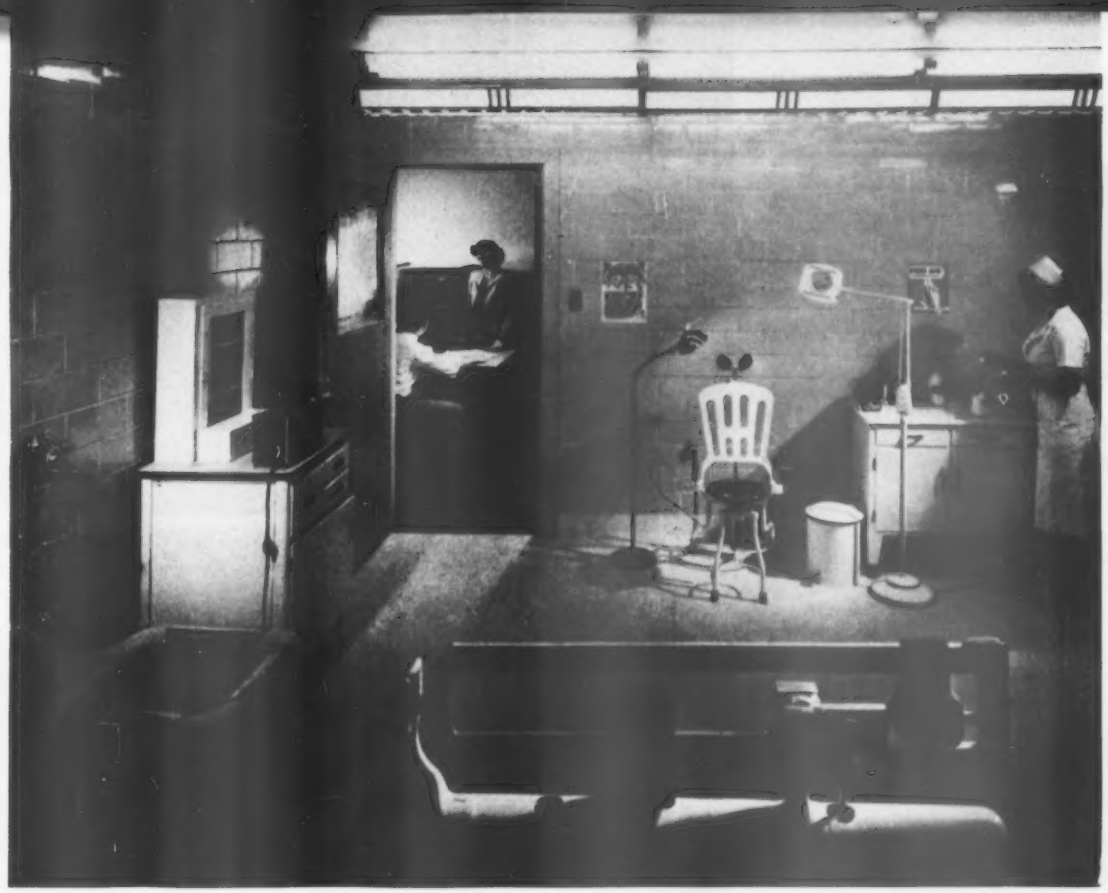
LIGHT PASTEL COLORS used throughout the plant have a dual purpose. They have eye appeal, and discourage the toleration of dirt. *Turn the page*

INDIVIDUAL CUBICLES are for craftsmen who develop and design Duncan products. Each booth is well lighted and equipped.

ENGINEERING ROOM has ample space for draftsmen. Shoulder-high partitions separate engineers along left wall.



LUNCH COUNTER of stainless steel is supplied from all-electric kitchen at right. Food odors are drawn from counter into kitchen and exhausted through the roof. Painted rough cinder block was used for walls and partitions in this area.



DISPENSARY was built of materials that clean easily. Walls are glazed tile; floor is terrazzo. Both fluorescent (general) and incandescent (emergency) lighting were provided. Suburban location made good medical facilities a "must."

LADIES' DRESSING ROOM includes plastic counters with built-in shelves, large mirrors, aluminum stools, tile walls.

COVERED WALKWAY and raised walks in parking area are heated by snow-melting coils. Drains carry water away.

BETTER PLANTS for today's... and tomorrow's... needs

A LOT OF PLANT for $9.50 a square foot! That's what Rotor Tool Company's new Euclid, Ohio, plant cost. And the $9.50 covered plenty of trimmings, including complete air condi-

WHEN THE MERCURY hit the 90's on more than 30 days last summer, many plants in the Cleveland area had to curtail operations and send people home. But not Rotor. Its

Fully Air Conditioned for Comfort

A SIGNIFICANT PLANT OF 1952-53

NAME: Rotor Tool Co.
LOCATION: Cleveland

PRODUCT: Portable tools
EMPLOYEES: 150

ARCHITECT, ENGINEER, AND BUILDER: Leonard H. Krill Construction Co. Cleveland

BY MOVING to a new air-conditioned plant, Rotor Tool has already charted gains in manufacturing efficiency of from 3% to 5%. And it appears that efficiency will further improve as newer employees gain skills. Total cost of the new plant, including complete air conditioning and many extras, was only $9.50 per square foot.

Rotor makes precision portable tools, pneumatic and high-cycle. Air conditioning might have been justified on the basis of precision machining and grinding of metal parts (especially magnesium) to tolerances within 0.0002 inch. But this company justified it also for comfort and efficiency.

Along with the gain in manufacturing efficiency,

tioning for both factory and office areas, acoustical office ceiling, heat-absorbing screen for factory windows.

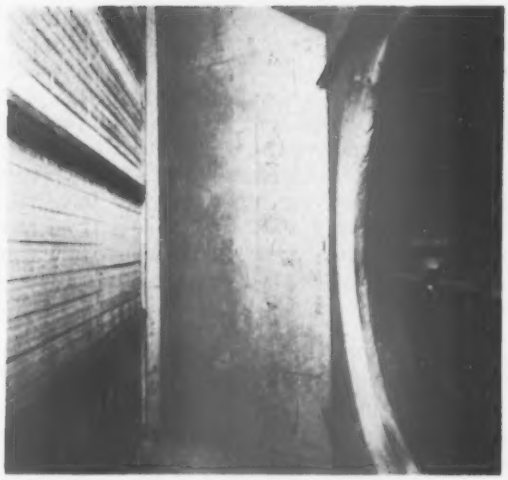
cool and dry employees worked full eight-hour days in complete comfort. And manufacturing efficiency stayed up, too.

and Efficiency

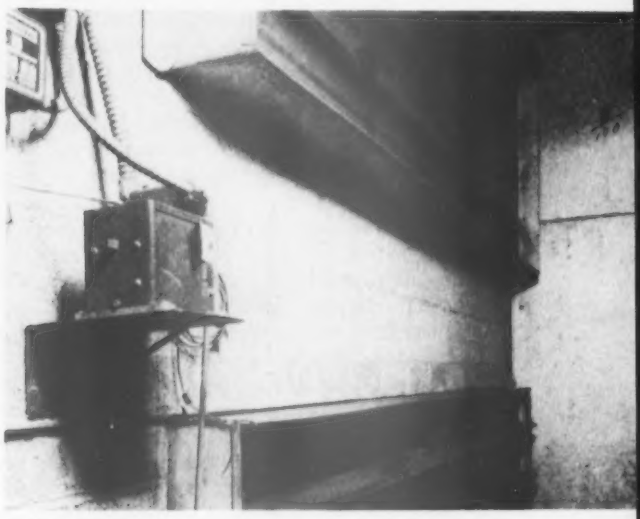
Rotor is saving in many other ways. Mating and inspection of precision parts is speeded considerably by the plant's uniform temperature. Low humidity keeps them from rusting, too. Parts in process and storage remain clean. Floors, walls, windows, beams, machines, piping, and other dust and dirt catchers will stay bright and clean much longer. And janitorial costs are being kept low.

Air conditioning had a real test during the first few months of operation. Last summer, temperatures in the Cleveland area rose above 90 degrees on more than 30 days. While many plants cut operation, Rotor's employees worked in comfort.

The company based its purchase of air condition-



COOLED AND DRIED AIR is forced through ducts to all corners of the plant by this 50,000-cfm. fan unit.



UPPER DAMPERS control supply of fresh air brought in from roof. Lower dampers control outgoing air from plant.

PLIOTRON FILTERS are easy to clean. Electric eye shown on wall shuts off air conditioning in case of fire.

ing on cost per employee per hour over five summer months for 15 years. Original estimates showed it would cost 3½¢ to 4¢ per man-hour. Careful meter readings and cost records prove it will cost 3¼¢ or less, depending on the gain in employment. This amounts to less than 1% of the hourly cost of labor and overhead for the plant.

Total cost was $48,174, or $1.20 per square foot, to air-condition the entire plant. That included the combined services of heating, cooling, dehumidifying, filtering, and ventilating. Cost per year, including 15-year write-off, maintenance, and power cost was $5767. That is less than 15¢ per square foot per year.

Factory System

There are three separate systems. The factory system, rated at 115 tons, is the largest. It cost $40,724, or $1.27 per square foot, feeds cooled and dehumidified air to 448,000 cubic feet. Excess capacity exists to keep the compressor under load less time and to provide for expansion of the working force. All equipment, including the compressor, is housed in a 20x30-ft. room.

In summer, air from the shop and from outside is used in controlled ratios. Interlocked dampers permit the amount of air brought in from outside to be increased as outside temperature drops. At 65 F. only outside air is used and plant air is exhausted by roof fans.

After mixing, air is drawn through plastic filters (Pliotron) that act electrostatically. These filters extract the finest dust, smoke, and soot. Large fin-type coils next cool and dry the air. A 50,000-cfm. fan unit then forces the cooled and dried air through long ducts to all corners of the plant.

Machining magnesium can be hazardous, and Rotor uses many magnesium parts. In critical areas photoelectric sensory units hung from the ceiling are set to shut off the air conditioning and start roof fans at the first hint of smoke or fire. Similar devices are located in outside, recirculating, and delivery ducts. These will stop the fans and close the dampers if smoke should enter the system.

In winter, a gas-fired heater replaces the cooling function. It heats variable amounts of recirculated air as dictated by thermostats. A bypass controls the amount of air passing through the furnace.

Office Systems

There are two, each independent of the other and of the factory system. A 5-hp. packaged unit serves the east half of the office through separate ducts. And a 7½-hp. unit cools the west half where the heat load is greater. Total cost for conditioning the office was $7450, or $0.93 per square foot.

Separate thermostats are used. And heating coils have been installed in the units for year-round conditioning. Rated together at 13 tons, the office units serve 88,000 cubic feet.

Other Plant Features

HEAT-ABSORBING SCREENS · Copper screens (Koolshade) shade sunlight from three factory exposures—east, south, and west. They roll on tracks and can be removed quickly for cleaning and storage. The screens reduce glare, also.

GLARE-REDUCING GLASS · Around the sides of the office are three top rows of blue-green glare-reducing glass and two lower rows of clear glass for good vision. Seeing is comfortable, and radiant heat is reduced. Rotor found it cheaper to put windows in the plant than to build a solid brick windowless wall.

LOW-COST OFFICE CEILING · Rotor first got a cost estimate on an unfinished office ceiling with light fixtures suspended from the beams, 14 feet up. This ran $1800, including painting. The company investigated a suspended acoustical ceiling (Celotex, Acousti-Line), and found an excellent ceiling, including lighting, would cost only $1600 more, or $3400—less than 0.1% of the annual office payroll. This, Rotor deemed, was a low price to pay for quiet conditions, better appearance, and increased personnel efficiency.

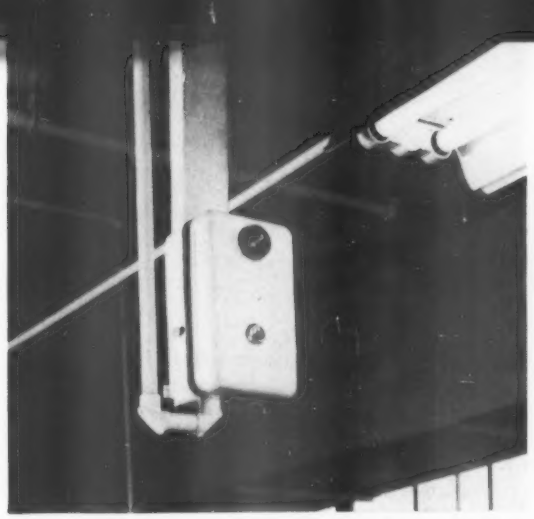
Fluorescent light fixtures, air diffusers, and sprinkler lines are suspended below the finished ceiling. And above is a plenum chamber concealing all wiring and piping, as well as air conditioning ducts. To continue the modern theme, Rotor laid a two-tone brown and beige asphalt tile floor in a diagonal pattern. Furniture was painted green; walls fawn and Swedish red.

BRIGHT COLORS · Rotor also used color throughout the plant: Chartreuse and Hunter green on the walls. Aluminum on piping and steelwork, white on the ceiling. Machinery is gray. Plant looks fresh and cheerful.

PLANT LEASED · Instead of buying its plant outright or with a bank loan, Rotor leased it on a 15-year basis from a building corporation. Annual rental is 10½% of the cost of the building. At the end of 15 years, Rotor must negotiate for a new lease. The building company provided 3½ acres of land, a 40,000-sq. ft. single-story brick building with concrete floor and an insulated 25-year roof.

Rotor added 55- to 60-foot-candle illumination, a bus-duct distribution system, air conditioning, and landscaping. These extras added $1.86 a square foot to the basic cost of $7.64. Total cost of the well-lighted, air-conditioned, fully painted, attractive plant came to $9.50 a square foot.

BUILDING PROCEDURE · Rotor didn't ask an architect to lay out its proposed plant. Instead, its own employees created a complete new production layout with templates. Revisions were made. Then a local builder who had erected many small



AT FIRST HINT OF SMOKE in hazardous machining areas, photoelectric units shut off air conditioning, start roof fans.

plants in the area was called in. After receiving the builder's proposals for economical design, Rotor double-checked them with an architect. By using this procedure, Rotor believes it got a good plant, well designed, and built at lower cost.

EXPANSION PLANS · By adding 4½ bays of new high-speed machinery at any time, production can be increased 50%. Space is available for similar growth in service departments. Provision has been made in planning for carrying increased electrical load by extending bus ducts. The air conditioning system can handle heat from more machines and employees. Plenty of land is available for building a new section to increase floor space 50%. If necessary, a rail spur can be run to the plant.

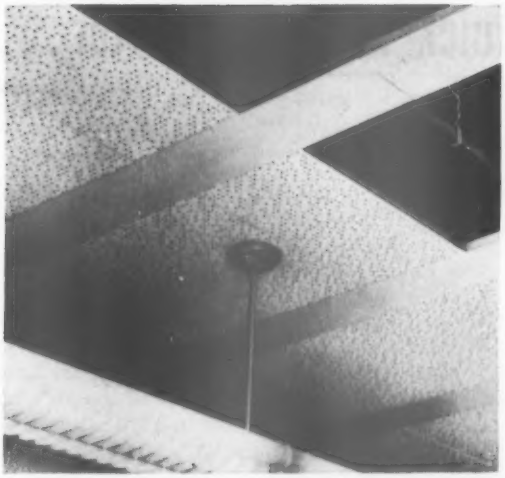
SPRINKLER SYSTEM · Rotor doesn't look on its sprinkler system as a cost item. Instead, the saving on insurance will pay off the cost of the sprinklers in 8½ years. Meanwhile, plant, personnel, and equipment get maximum protection.

NO WATCHMAN · Rotor solved the watchman problem by using American District Telegraph service. The sprinkler system, doors, and beams were equipped with sensory devices. Should someone try to get into the plant after hours, or should fire break out or pressure drop in the sprinkler system, ADT's office is automatically notified. Emergency crews can reach the plant in a few minutes.

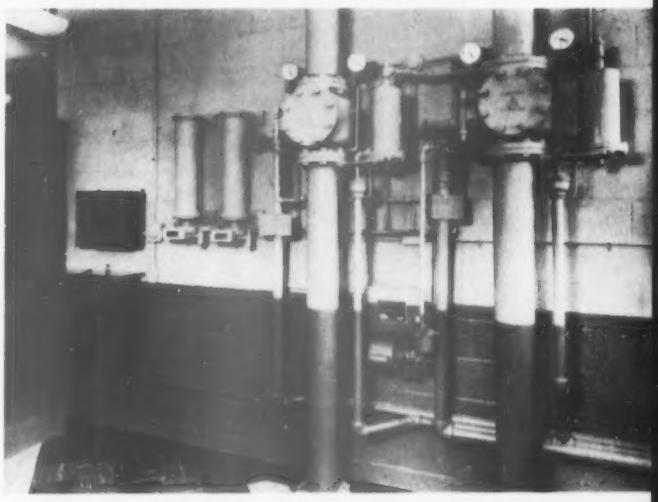
LAWN SPRINKLERS · Even the front lawn is watered without effort. Underground water pipes lead to water outlets set in the lawn at regular intervals. When a main valve is opened, water sprays out in a uniform pattern. No attention is required.

LANDSCAPING TO COME · Shade trees and evergreens will be placed this spring according to plans drawn by a landscape architect.

ARCHITECTURALLY PLEASING and functionally designed, Rotor's new plant helped increase production efficiency.



ACOUSTICAL CEILING costs about 73c a square foot, installed. Note random pattern of noise-trapping holes.



SPRINKLER SYSTEM is monitored here. Pressure drops at gages will summon ADT and local fire departments.

Quick Ideas for Better...

Plant Services

Both central-station and isolated plant services have advantages, says one plant engineer with a broad background of plant design experience. And sometimes you ought to use both. For example, he contends individual refrigeration cooling units are cheaper to install and maintain than a centralized brine cooling system with its long runs of insulated piping. Yet for the same reasons he prefers a central cooling tower over individual evaporative condensers for compressors aggregating 100 tons or over in capacity.

Catwalks for maintenance of overhead services are paying off in the Sandusky (Ohio) plant designed by Albert Kahn Associates for New Departure Division of General Motors. These utility walkways run the length of the building and parallel to rows of lighting fixtures. Maintenance doesn't interfere with production.

Layout for future expansion at Delco's new D plant puts power house (right) some distance from first manufacturing unit (left background). But the bridge supporting the pipeline connecting the two is designed for changes. When a second unit is added (in space in left foreground), building trusses will support pipeline in its present position and existing bridge will be unbolted and removed.

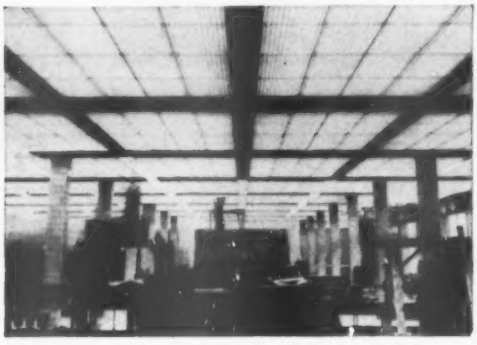
In an effort to cut installation, maintenance, and relayout costs of pipeline services, engineers at Delco's new plant have hit upon a unique plan. They have reserved an area in the overhead truss section, extending through the first 5 feet above the truss chord, strictly for utilities. It contains all services except sanitary waste lines and rain downspouts.

Furthermore, Delco allows no permanent brackets or welded fixtures to hold or support services, but uses removable clamps. It keeps the wet and dry lines apart—water, steam, return lines, and vents on the south and east sides; gas, air, bus duct, and cables on the north and west sides. All services are distributed in loops, with ample valves to allow cutting off a small section without tying up a big area. Steam is distributed in five loops; gas, water, and air in three loops.

To clean its plating-room air of fumes before exhausting it to the outside atmosphere the new Delco plant in Dayton passes the air through a water wash. In this corner of one of two underground filtering rooms a 100,000-cfm. exhaust fan pulls fume-laden air through ceramic-type filter (right). Water trickling down filter removes 97% of fumes, and discharges down a sewer.

Problem of storage of process gases—hydrogen, nitrogen, oxygen, and others—was solved at Sylvania Electric's new Woburn (Mass.) plant by putting cylinders in a separate low-cost building. Located on an elevated floor in rear of main building, it furnishes gases through underground pipelines to assembly benches and exhaust machines. Gas cylinders are arranged in banks, with manifold connections to underground supply lines.

Air conditioning can be economical. Cold well water at 55F. or lower is the only refrigerant for the air-conditioning system at the new Melrose (Mass.) plant of Commercial Filter Corporation. Equal to 450 tons of refrigeration, the air-conditioning system can maintain inside temperatures 10 to 15 degrees below outside readings, even on the hottest days. Cost of operating the system is about 60¢ an hour.



Nearest thing to "sky light" is the luminous ceiling in the 80x200-ft. packaging room of the new Mennen plant near Morristown, N. J. Complete light diffusion and elimination of spectacular reflection is provided by a continuous series of egg-crate fixtures hung below 580 fluorescent lamps, each 8 feet long. Elimination of glare and shadows, says A. M. Kinney Associates, architects, will reduce employee fatigue. Vertical sides on louvers reduce dirt and dust deposits, hence cost of maintenance cleaning. Sprinklers, utilities, and noise-reduction panels are above ceiling.

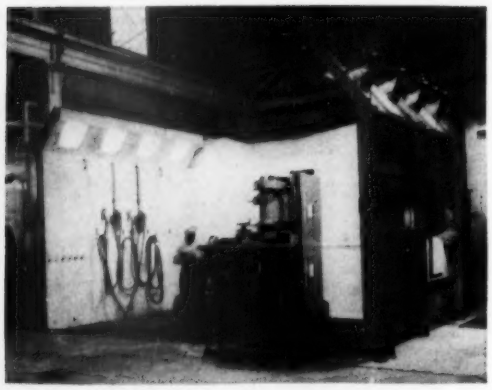
Doors between air-conditioned departments at the Harris plant of Greenwood Mills Corporation (Greenwood, S. C.) open and shut automatically for workers or floor trucks. Interruption of electric-eye beam from floor (arrow) to ceiling relays signal to actuating switch which activates mechanical arm over door.

Here's one way to squeeze all the value you can get out of a limited or costly water supply. The idea comes from a large air conditioned food plant. After using its cold water supply for refrigeration machine cooling, this company re-uses the water for roof-spray cooling, then again for lawn sprinklers.

Design for easy maintenance pops up all over Delco's new plant. Here, perimeter lighting fixtures on building walls are mounted so they can be swung in over roof. Bulb replacement is an easy and safe one-man job.

For those new plant service cut-over problems, spend a few hundred dollars more for "isolating" valves in your temporary pipeline services, says one plant engineer. When it comes

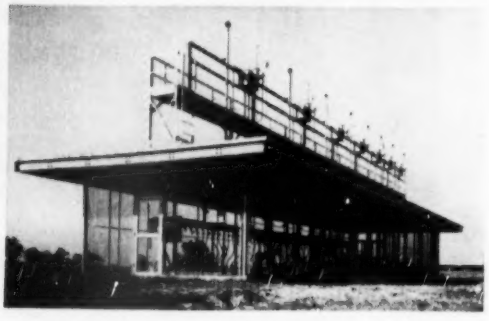
time for the changeover to permanent lines the easier cutover will save many times the extra cost in labor downtime.



Open top and side of built-in paint booth saves production time at Besly-Welles Corporation's new plant in Beloit, Wis. It permits lowering of heavy grinders directly onto booth by an overhead crane. Paint spray and fumes are drawn down through grilled floor into a water curtain which washes and filters the exhaust before discharging it to outside atmosphere.

Do automatic paint-spray enclosures and drying or processing ovens have to be on the main floor? One plant engineer is considering the idea of putting them on the roof, where they'll be easier to exhaust. And by this double-decking idea he expects not only to save a lot of space, but also to solve the problem of heat control and clean air. No dirt drift from pre-cleaning operations. Easy to get at for process change or maintenance.

Sanitary plumbing and fixtures costly to repair? At the new Delco plant, engineers have provided a crawl space along and behind each wall holding sanitary fixtures.



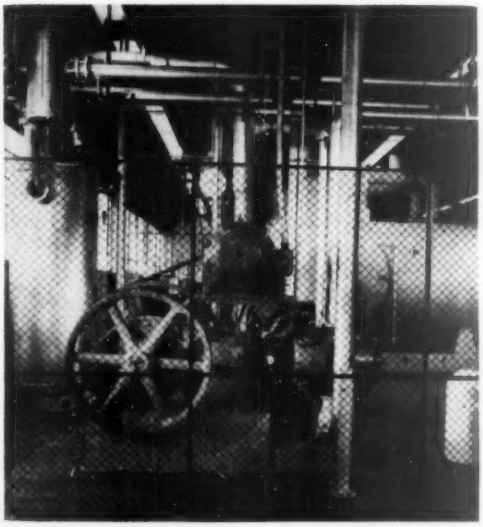
Canopy of underground tank farm at International Harvester's new motor truck engineering and laboratory building at Fort Wayne is good-looking as well as useful. It was designed by Albert Kahn Associated Architects and Engineers to supply gasoline fuels and lubricants for test cells. There are eight tanks with total capacity of 44,000 gallons. Tanks atop canopy provide constant head in supply pipelines.

If self-fired space heaters are to be part of your plant heating system, get them in early. You can use them for cold-weather salamanders, without the costs and risk of the old type. They will not only protect the concrete pours, but also keep the chill off construction workers.

Tips on better entrance facilities for employees:

- The Upjohn Company's new Kalamazoo plant has underground bus-loading platforms.
- At A-C Spark Plug, escalators take employees up and down the bridge over the railroad on the path to the parking space.

To cut down on plant heat lost by exhaust systems, the fume exhaust hoods at Delco's new Dayton plant are designed for two jobs. One is to bring in a supply of fresh air—the other to exhaust the fume-laden air. Usually this is done by bringing the fresh air in around the perimeter of the duct and exhausting it up the center of the duct. By a local balance of intake and exhaust, bleeding out of warmer plant air is minimized.



Where will you put your package steam generators, air compressors, and other mechanical plant service equipment? The problem was solved at low cost in the Lafayette (Ind.) plant at Fairfield Manufacturing Company. The Austin Company, engineers, set them out on the open floor, separated from manufacturing area by a 10-ft. woven-wire partition.

To cut water consumption at group-type, circular wash fountains, Delco is using four separate faucets instead of the conventional perimeter foot treadle and 360-deg. spray. Faucets are spaced 90 degrees apart on each unit.

Crane cab operator doesn't worry any more about baking his tootsies in furnace heat below him at the Cleveland Works of Jones & Laughlin Steel Corporation. A Dravo air-conditioner enclosure has reduced summer heat from 150F. to 80-85F.; in winter it stays 68-72F.

To check fuel consumption, some large users of natural gas are providing "bored meter runs," with their own meters, as a double check on the utility meter. The precision-bored pipe ahead of the meter eliminates all turbulence in gas flow, thus insures accurate readings.

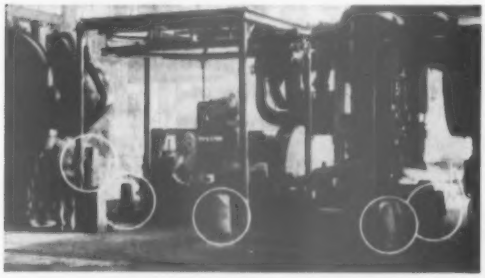
Roof-spray cooling saves W. A. Sheaffer Pen Company the equivalent of 33 tons of refrigeration at its new Fort Madison (Iowa) plant. Engineered by The Austin Company, the system discharges 200 gpm. of waste water from the air conditioning equipment in warm weather.

Connecting the floor drain system to an underfloor exhaust system is the solution in one new plant for heavier-than-air fumes.

If you're limited on cafeteria space and capacity, getting people out faster after dessert is the cure. One way to do it—provide recreational rooms or facilities elsewhere, such as movies, or shuffleboard in plant aisles.

To discourage loitering in its washrooms, Standard Pressed Steel has tried out the psychology of open-door premises. The company did away with outer doors, and added protective baffles.

To keep odors from leaking out of an area, keep air leaking in. At the Shaeffer Pen plant in Ford Madison, slightly negative air pressure in certain rooms is keeping undesirable odors, as well as dust and paint spray, from spreading.



A tough ventilation problem was solved in the Dodge forge shop by use of built-in "spot" coolers. Eleven fresh-air outlets are located at points along the line where extreme heat from the hot steel billets would cause unpleasant working conditions. All outlets (circled) are connected to a large underground main duct. They're divided into two parts. Top half sucks in smoke and exhaust gases, bottom half blows fresh air—warmed in winter—into the area. Each station is adjustable for volume and direction of air flow.

For easy and fast machine relayouts, put your machines on wheels and provide flexible connections. That's what one company did, and saved cost of the innovation in the first move.

You'll find high-speed escalators in some of the newer plants. They whisk employees between floors in office sections, to and from cafeterias, to washrooms and locker rooms. H. J. Heinz Company, Pittsburgh, has one that runs *up* in the morning, *down* at night.

How's the weather outdoors? A common question in windowless plants. Heppenstall Company, Pittsburgh, answers employees' questions with a signal light panel opposite the elevator on each floor. A white light means fair; green, cloudiness; red, rain or snow.

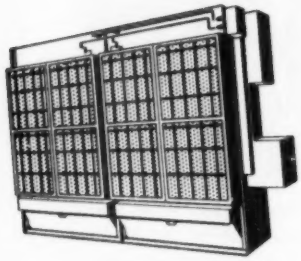
Double-duty cafeteria can be transformed into a meeting room if a folding wall (on a ceiling mounted track) is installed to close off the cooking and counter areas. Rand-McNally has one in its new Skokie (Ill.) plant. And we've seen the idea used successfully in other plants.

See also FIELD REPORTS, page B-144.

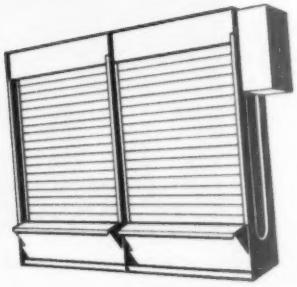
AAF AIR

AIR FILTERS

AAF's complete line of engineered air filters is your assurance of obtaining the right type and capacity unit for your specific job. Such factors as degree of air cleanliness needed, critical air volume, accessibility of filter and type of maintenance desired—all receive careful consideration in the selection of your AAF Air Filter.



ELECTRO-MATIC
Electronic, Self-Cleaning Precipitator

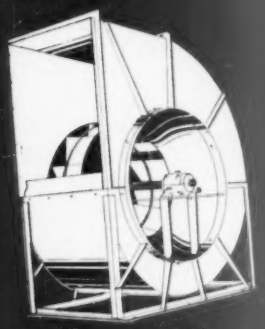


MULTI-DUTY
Self-Cleaning Air Filter

HEATING AND VENTILATING PRODUCTS

Herman Nelson products are recognized for engineered features that make for long-life, trouble-free service and low operating costs. If your problem is one of heating or moving air in volume, there's a Herman Nelson unit of a type and size ready-made for each and every job requirement.

HORIZONTAL
UNIT HEATERS

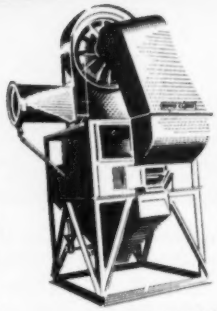


HERMAN NELSON
CENTRIFUGAL FANS

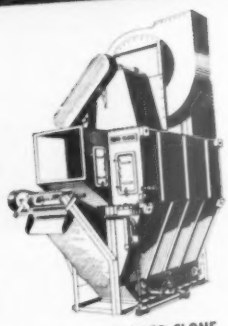
DUST CONTROL EQUIPMENT

ROTO-CLONE's wide and diversified line is the result of successfully solving many and varied dust collection problems over a 20-year period. That's why your "special" dust problem can, in all probability, be solved at a saving with *standard* ROTO-CLONE equipment.

Type D ROTO-CLONE
A dynamic precipitator combining functions of exhauster and dust separator in a single unit.

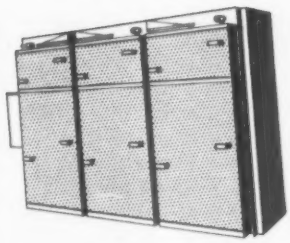


Type W ROTO-CLONE
A dynamic precipitator using water sprays to increase efficiency and minimize abrasion.

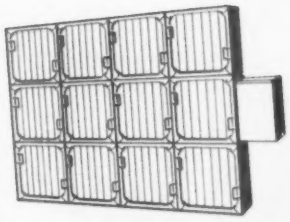


Type N ROTO-CLONE
A hydro-static precipitator with inverted S-shape water curtain cleaning action.

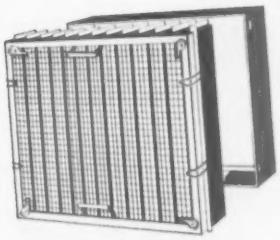
HEADQUARTERS



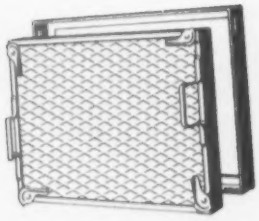
ELECTRO-CELL
Cell-Type Precipitator



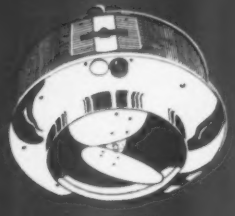
ELECTRO-PL
Dry-Type Electronic Filter



AIRMAT PL-24
Dry Filter

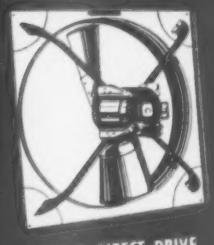


TYPE M/W-H/V UNITS
Washable Unit Filters

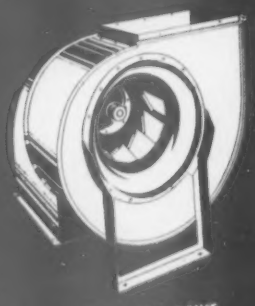


VERTICAL
UNIT HEATERS

GAS-FIRED
UNIT HEATERS



BELT & DIRECT DRIVE
PROPELLER FANS



BELT & DIRECT DRIVE
UNIT BLOWERS

Filtered air, dust control, heating and ventilating—all are important factors in planning better plants for today's and tomorrow's needs. American Air Filter and Herman Nelson Products bring you the newest and best in these services. You'll find the people at "Air Headquarters" eager to discuss your problems and ready with practical solutions. They're no farther away than your telephone. Consult the Classified Directory.

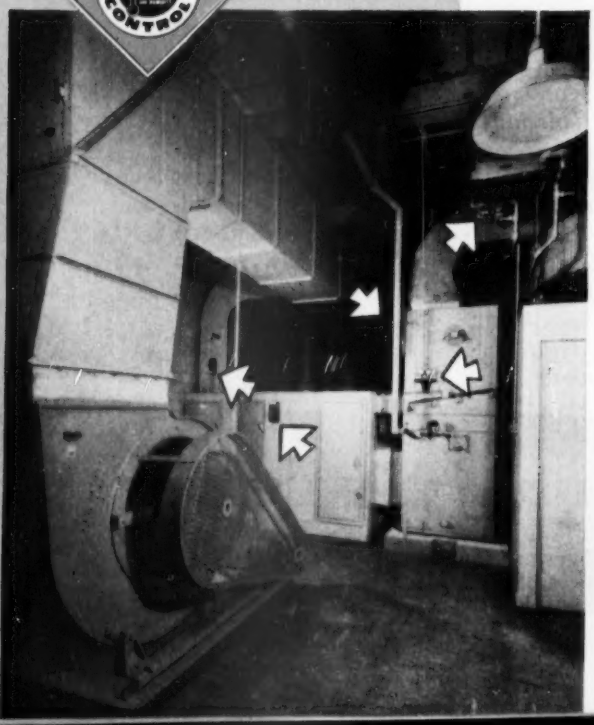
AAF

herman nelson

American Air Filter
COMPANY, INC.

POWERS for Heating and

PNEUMATIC CONTROL SYSTEMS

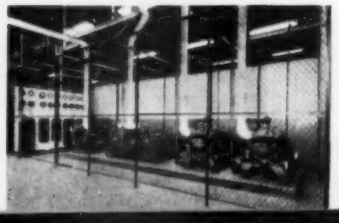


POWERS Design for MODERN CONTROL PANEL

In the unique functional design of this Control Panel are integrated various types of POWERS pneumatic controlling, indicating and recording instruments. It masterminds the operation of four complete year round air conditioning systems in the modern plant shown on the next page.

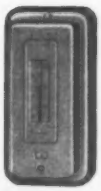
Photos at left and top and bottom of next page show air conditioning systems regulated by the Control Panel. Arrows indicate Powers controls.

Photo below, left—shows four refrigerator compressors, one for each air conditioning system; photo right—Powers air compressor and pilot valves supplying air pressure for control system.



Air Conditioning

Increase Production
Improve Products–Lower Costs



Room Thermostat for Offices

POWERS TEMPERATURE and HUMIDITY CONTROL SYSTEMS

prevent OVER-heated air in process rooms, laboratories, offices and other spaces. Comfortable, healthful room temperature — not only increases output of workers, but—

★ Cuts Heating Costs up to 25%—Keeping each room at its proper temperature prevents waste of fuel from OVER-heating. With todays much higher fuel costs, bigger savings than ever before are now possible with Powers control.

Constant Temperature and Humidity conditions in each room can be maintained at any predetermined point with Powers control. It can be installed in existing as well as new buildings.

25 to 40 Years of Dependable Service with very low maintenance cost is reported by hundreds of users. Powers control is notable for its continuous accurate performance.

Precision Control for Processes—Wherever product uniformity and quality are dependent upon precise temperature and humidity regulation, use Powers controlling, indicating or recording instruments.

New modern plant commemorating 60th anniversary of The Powers Regulator Co., pioneer in pneumatic operated controls for heating, air conditioning systems and industrial processes.

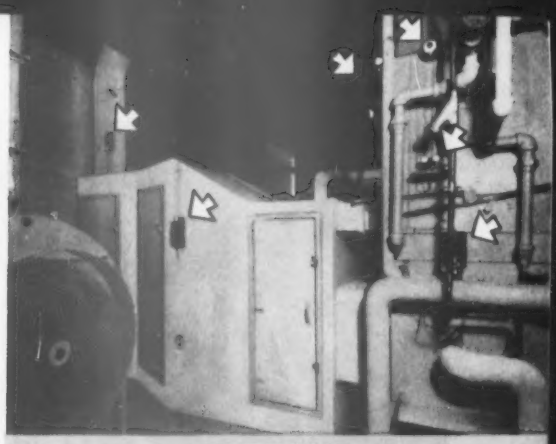
Phone or write our nearest office for help in selecting the type of automatic control that will give best results for your requirements. There's no obligation.

THE POWERS REGULATOR CO.

Established 1891 • SKOKIE, ILLINOIS • Offices in Over 50 Cities

CHICAGO 13, ILL., 3819 N. Ashland Ave. • NEW YORK 17, N. Y., 231 E. 46 St.
LOS ANGELES 5, CAL., 1808 W. 8th St. • BOSTON 15, MASS., 125 St. Botolph St.
DETROIT 1, MICH., 2631 Woodward Ave. • TORONTO, ONT., 195 Spadina Ave.
PHILADELPHIA 32, PA., 2240 N. Broad St.

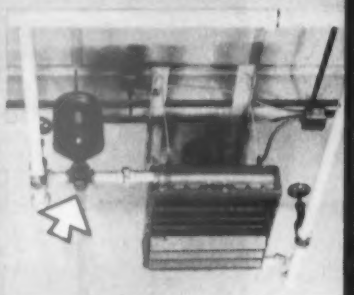
(a83c)

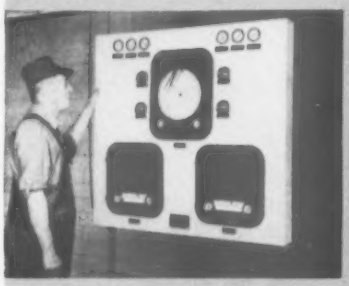


POWERS

Above: Arrows indicate some of the many controls applied to air conditioning system: Powers Duct Hygrostat, Duct Thermostat, Pneumatic Switch, Diaphragm Valves and Damper Motors Static Pressure Regulators, etc.

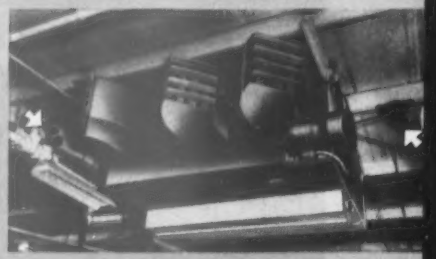
Photo at right shows ceiling type unit heater used in factory. It is controlled by wall type thermostat which also regulates Vulcan fin type radiation below windows.





Left: Instrument panel for Powers MASTROL System of forced hot water temperature control for heating.

Below: Factory fresh air ventilating units heat and filter outdoor air, providing two air changes per hour in winter and ten in summer.

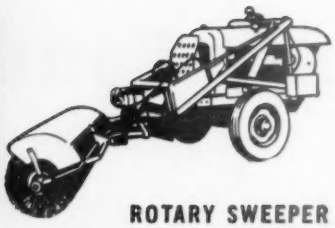


POWERS

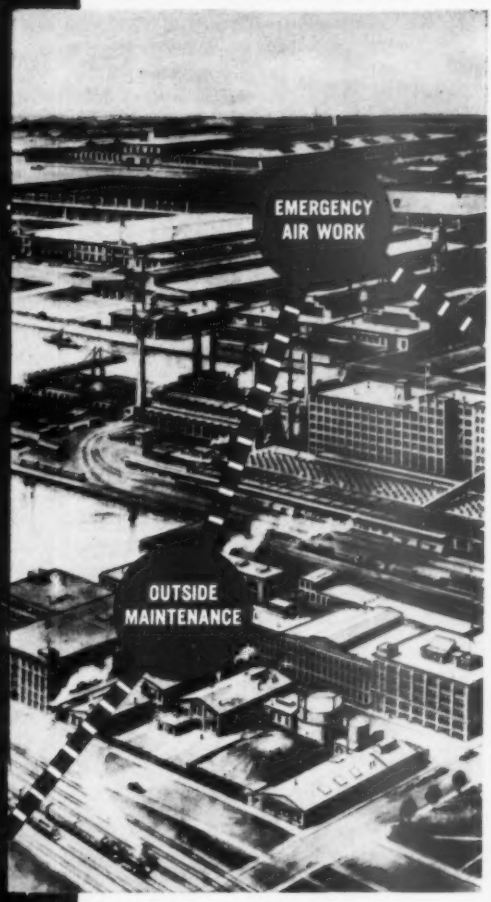
"All in a Day's Work"

FOR THE SCHRAMM Pneumatractor

HERE'S HOW YOU CAN USE THE Pneumatractor

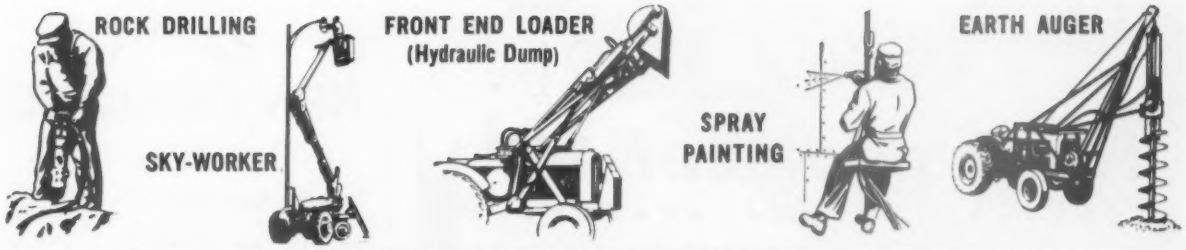


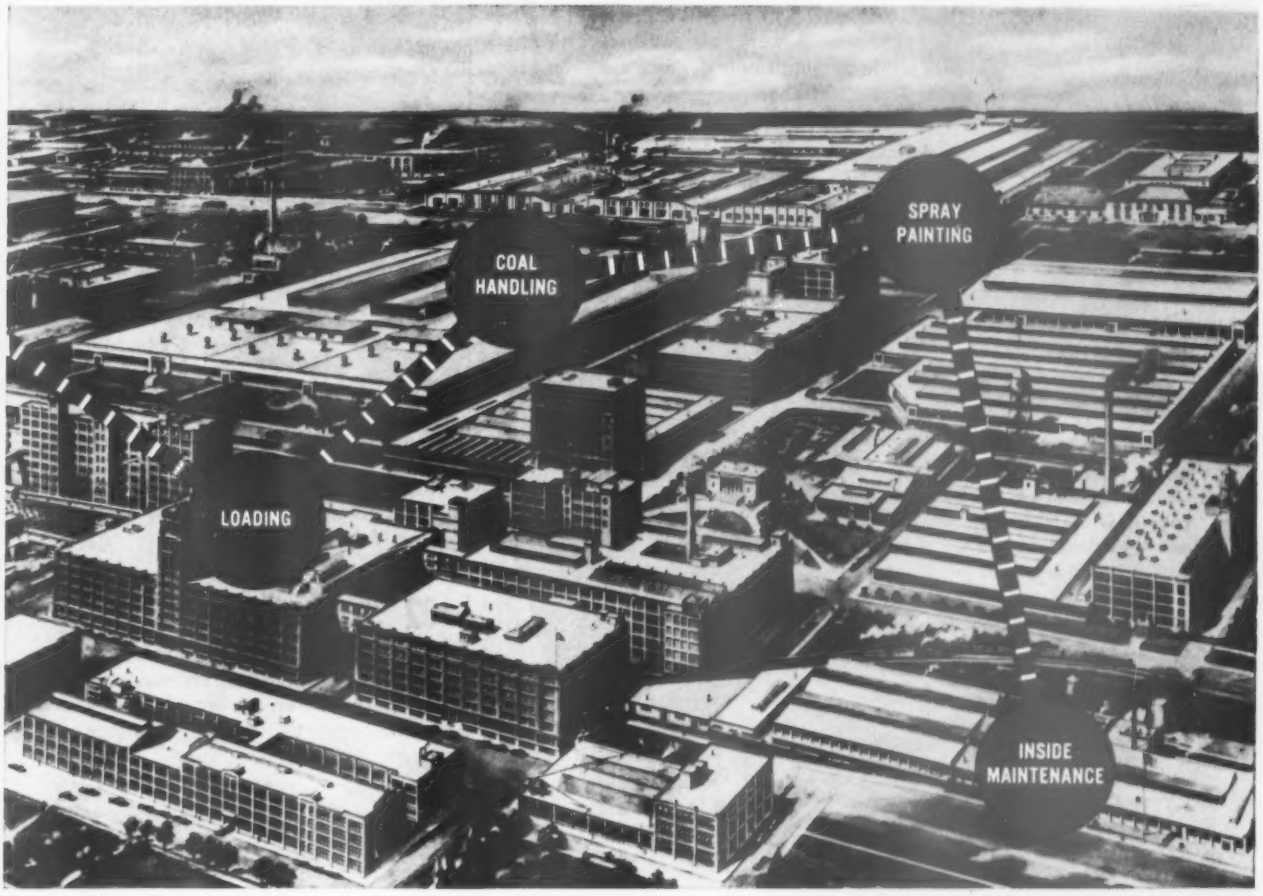
ROTARY SWEEPER



Pneumatractor USES

Moving ore and coal
Backfilling or grading
Unloading and placing steel
Moving or loading a lot of snow
Ditching, Excavating, Backfilling
Demolition and Concrete Breaking
Repairing overhead power lines and lights
Painting spraying super-structures, etc.
Loading excess or left-over dirt
Driving stakes and fence posts
Post Hole Digging
Mowing factory lawns
Sweeping leaves, dust, snow and light dirt





Pneumatractor . . . a self-propelled Air Compressor that will PUSH-PULL-POWER anything a wheel tractor will

RCA Victor's plant at Camden, N. J., consists of 18 buildings stretched out over a 2-mile area.

RCA uses the Schramm *Pneumatractor* to furnish air and power to do the many maintenance jobs about the plants, finding its portability and versatility perfect for covering this widespread area at quite a saving in man-power.

Being self-propelled, the *Pneumatractor* is moved to as many as three buildings in one day even though widely scattered. The same man who drives the unit to the job also operates it when he gets there.

Used for coal-handling, driving stakes, fence posts, paint spraying, etc., the *Pneumatractor* is also used for emergency maintenance work. In one instance it substituted for a shop compressor that failed on a paint spraying job, the *Pneumatractor* was driven to the building, 300 feet of hose attached, and the paint spraying continued to meet a shipping deadline.

This self-propelled air compressor costs less than a separate tractor and compressor. Whether your plant is large or small, you will want a *Pneumatractor*.

Write today for your copy of catalog 5140.

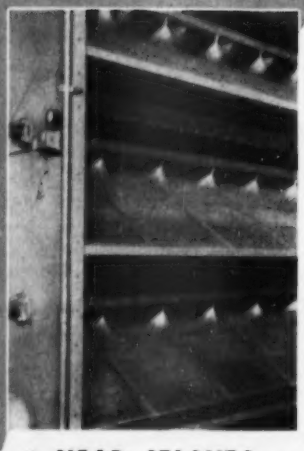
SCHRAMM, INC.

The Compressor People

WEST CHESTER • PENNSYLVANIA

B-107

MODERN Fan Equipment for



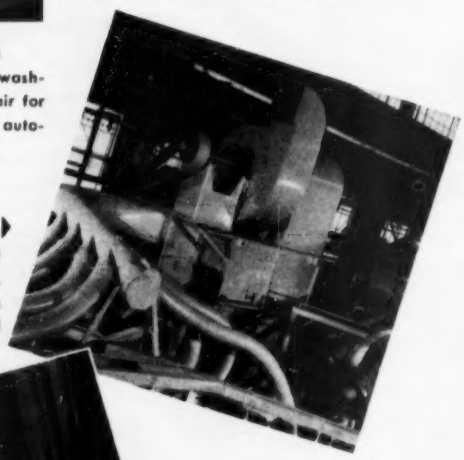
You're apt to see Clarage fans, blowers, air washers and conditioning units on industrial jobs everywhere . . .

For Clarage builds equipment that factory engineers and executives can rely on to give long uninterrupted service and economical operation . . .

So, if you have a new plant or modernization program underway, call us in! . . . and you'll be in good company, since 97 of America's 100 largest corporations now use Clarage fans and allied equipment.

▲ **NEAR ATLANTA**
One of 15 Clarage capillary washers assuring clean make-up air for paint spray booths in large automobile manufacturing plant.

AT FORD MOTOR ▶
One of 12 Clarage exhaust fans on dust collecting job. Well over 1,000 Clarage fans are now used by Ford Motor Company.



◀ **FOR LOCKHEED AIRCRAFT**
50 small Clarage fans for portable ventilation. Total Lockheed order included 200 of these direct motor driven units.

CLARAGE FAN COMPANY
KALAMAZOO, MICHIGAN

You can Rely on...
CLARAGE
Headquarters for Air Handling and Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA Canada Fans, Ltd. 4285 Richelieu St. Montreal

Free NEW CATALOGS

PLANT SERVICES

OTHER SECTIONS:

Buildings & Grounds Page B-40
Electrical Distribution . B-266
Materials Handling . . . B-324

60 Unit Heaters
Folder No. EC-136 on suspension-type unit heaters describes the product and tells where to use it. Installation and maintenance data. Shows a full line in seven capacities—10 to 45 kw. Electromode Corp.

61 Unit Heaters
Covers maker's propeller-type heaters, tells how to select, locate, and erect duct work, piping, and controls. Engineering data. 48 pages. Bulletin No. 3278. The Trane Co.

62 Unit Heaters
Here's a 24-page catalog (No. UH) that gives you capacities and dimensions for maker's line. Describes wiring for automatic controls, piping, connections. Grinnell Co., Inc.

63 Unit Heaters
Gas duct furnaces and unit heaters with cast iron heat exchangers in this folder and pair of data sheets. Specs and capacities. Parts illustrations. Automatic Gas Equipment Co.

64 Unit Heaters
Cast iron grid unit heaters are illustrated and described in this 12-page catalog. You learn how to select them, where they're being used. Piping diagrams. Bulletin No. CUH. D. J. Murray Mfg. Co.

To get these catalogs, circle number on reader's service postcard next to back cover.

Free NEW CATALOGS

65 Unit Heaters
Suggests applications and heating arrangements. Photos show installation in a variety of plants. Specs included. Bulletin No. 149-A. Modine Mfg. Co.

66 Gas Heaters
A full line of gas unit heaters and duct furnaces is illustrated and described in this 20-pager (No. GN-52). Specs, dimensions, applications. Reznor Mfg. Co.

67 Space Heaters
Forced air space heaters are subject of this 12-pager. Tells how you can use them for comfort and production heating. Bulletin No. 523-A. Dravo Corp., Heating Dept., Machinery Div.

68 Heating Equipment
Many models of gas- and oil-fired heating equipment shown in this 12-page catalog (No. SW-53). Charts, tables, and specs help you select. Janitrol Div., Surface Combustion Corp.

69 Heating Equipment
A collection of folders and bulletins describes several types of unit heaters. Specs, construction details, application information. C. A. Dunham Co.

70 Heating Products
In this 20-pager you'll find applications and operating data on boilers, oil heating units, convectors, and unit heaters. Illustrations. Form No. 586C. The National Radiator Co.

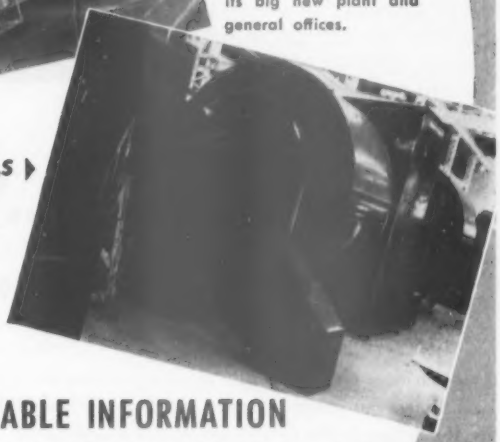
71 Portable Heaters
Tells how a portable heater can bring heat where you want it fast. Specs, how it works, in-

To get these catalogs, circle number on reader's service postcard next to back cover.

MODERN Industrial Plants

FOR MANUFACTURER OF CHEMICALS
Clarage fan to handle 125,000 c.f.m. of conditioned air. This company uses hundreds of Clarage fans for a wide range of air handling services.

AT UPJOHN
Clarage fans supplying conditioned air in pharmaceutical manufacture. Upjohn Company has in all 324 Clarage fans in its big new plant and general offices.



FOR REYNOLDS METALS
Recently shipped to Reynolds 8 Clarage fans of type shown. These fans handle 640,000 c.f.m. — installed outdoors.

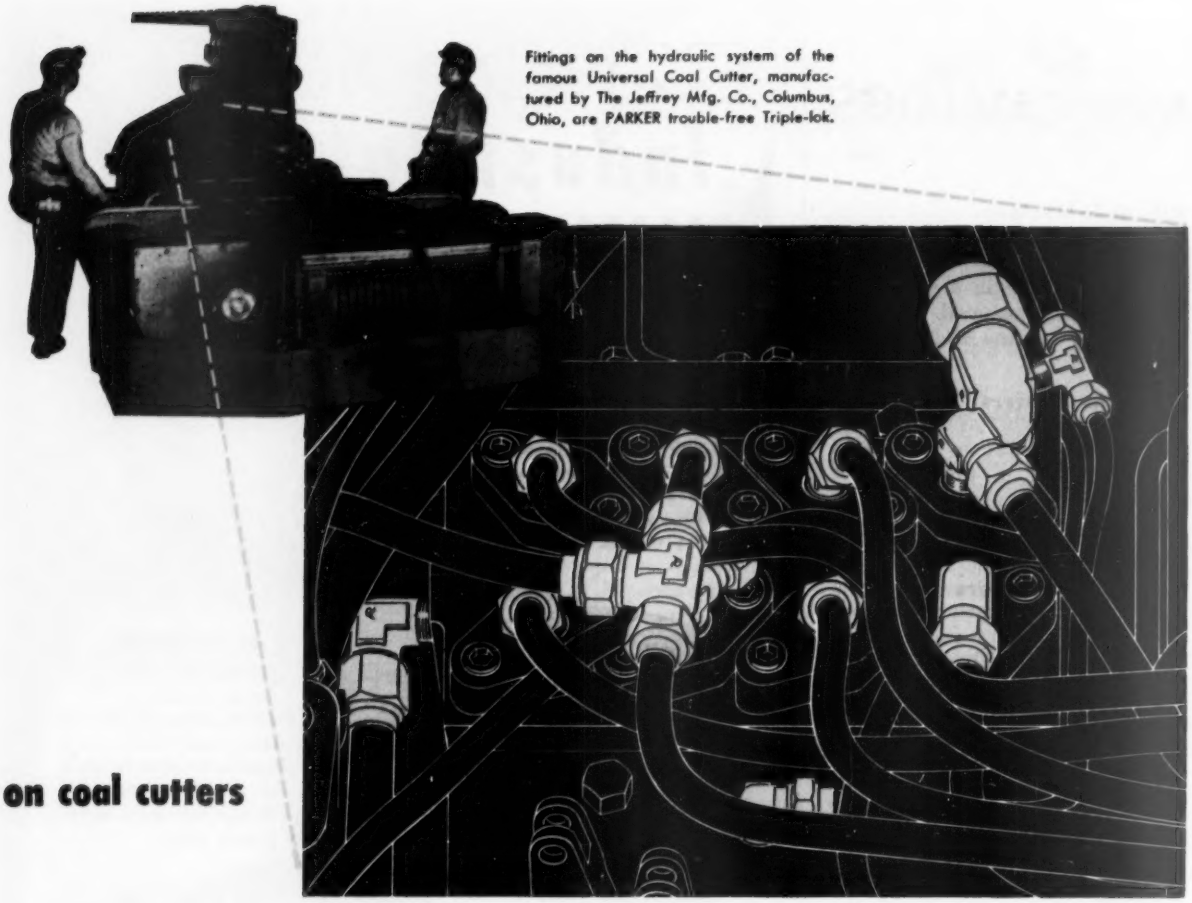
68 pages of VALUABLE INFORMATION

New Manual shows how to properly install and service Clarage fans, blowers and air conditioning units . . . valuable information adaptable to almost any type of fan job. Sent without charge to factory executives, plant engineers and maintenance officials.

CLARAGE FAN COMPANY
KALAMAZOO, MICHIGAN

You can Rely on...
CLARAGE
Headquarters for Air Handling and Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Ridgewood, St. Montreal



Fittings on the hydraulic system of the famous Universal Coal Cutter, manufactured by The Jeffrey Mfg. Co., Columbus, Ohio, are PARKER trouble-free Triple-lok.

on coal cutters

Tube it up...Forget it...WITH PARKER

TROUBLE-FREE TRIPLE-LOK FITTINGS

Few machines get rougher use than coal cutters in coal mines. Subjected to severe vibration, caused by the action of the cutting head, and operating under the most adverse conditions, all parts must be ruggedly built, including the hydraulic system.

You'll find Parker Triple-lok Fittings on coal cutters and many other machines used in rough, rugged service because they are leakproof under the severest conditions of vibration, elevated temperatures, high pressures and repeated assembly. Parker Fittings meet the specifications of the A.S.M.E. Code for Pressure Piping, as well as J.I.C. and S.A.E. standards.

So *tube it up* and *forget it* . . . with Parker Triple-lok Fittings. Ask your Parker Distributor for Tube Fitting Catalog 4300, or write The PARKER Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

This does it

Triple-lok . . . 3-piece flare fitting famous for its sleeve . . . the easiest way to install tubing systems. Made in brass, steel, stainless steel, aluminum alloy.

Precision Mark of

Leakproof Tube Fittings

Parker

TUBE FITTINGS • VALVES • O-RINGS

Plants in Cleveland • Los Angeles • Eaton, Ohio • Berea, Ky.

Parker

INDUSTRIAL TUBE FITTING

STOCKS CARRIED BY

AKRON 9, O.—B. W. Rogers Co., 850 So. High St.
ARDMORE, Pa.—Louis H. Hein Co., 15 West Lancaster Ave.
BALTIMORE 13, Md.—Carey Machinery & Supply Co. 3501 Brehms Lane
BALTIMORE 5, Md.—Whitehead Metal Products Co. 4300 E. Monument St.
BEAUMONT, Tex.—Standard Brass & Mfg. Co., 705 Milam St.
BOSTON 15, Mass.—A. E. Borden Co., 176 Brookline Ave.
BRYSON CITY, N. C.—Wallace Co. of Carolina, P.O. Box 572
BUFFALO 7, N. Y.—Whitehead Metal Products Co. 2128 Elmwood Ave.
CAMBRIDGE 39, Mass.—Whitehead Metal Products Co. 281 Albany St.
CEDAR RAPIDS, Ia.—Globe Machinery & Supply Co. 309 8th Ave., S. E.
CHICAGO 14, Ill.—Wallace Tube Co., 1300 Diversey Pkwy.
CINCINNATI 29, O.—Williams & Co., 3231 Fredonia Ave.
CLEVELAND 14, O.—W. M. Pattison Supply Co. 777 Rockwell Ave.
CLEVELAND 15, O.—B. W. Rogers Co., 1900 Euclid Ave.
CLEVELAND 14, O.—Williams & Co., 3700 Perkins Ave.
COLUMBUS 8, O.—Williams & Co., 851 Williams Ave.
DALLAS 9, Tex.—Metal Goods Corp., 6211 Cedar Springs Rd.
DAVENPORT, Ia.—Globe Machinery & Supply Co. 410 East Second St.
DAYTON 10, O.—J. N. Fauver Co., 1534 Keystone Ave.
DENVER 2, Colo.—Metal Goods Corp., 2425 Walnut St.
DES MOINES 6, Ia.—Globe Machinery & Supply Co. East First & Court Ave.
DETROIT 1, Mich.—J. N. Fauver Co., 49 West Hancock St.
HARRISON, N. J.—Whitehead Metal Products Co. 1000 South Fourth Ave.
HOUSTON 3, Tex.—Metal Goods Corp., 711 Milby St.
HOUSTON 1, Tex.—Standard Brass & Mfg. Co. 2018 Franklin St.
INDIANAPOLIS 27, Ind.—Korhumel Steel & Aluminum Co. 3562 Shelby St.
JACKSONVILLE, Fla.—Florida Metals Inc. 2937 Strickland St.
KANSAS CITY 16, Mo.—Metal Goods Corp., 1300 Burlington Ave., North Kansas City
KNOXVILLE 5, Tenn.—Leinart Engineering Co. 412 E. 5th Ave.
LOS ANGELES 4, Cal.—Haskel Engineering & Supply Co. 721 W. Broadway, Glendale
LOS ANGELES 12, Cal.—Metropolitan Supply Co. 353 East 2nd St.
MEMPHIS, Tenn.—J. E. Dilworth Co., 730 South Third St.
MILWAUKEE 3, Wis.—Morman Belting & Supply Co. 522 W. State St.
MILWAUKEE 4, Wis.—Wallace Cos. of Wisconsin 838 So. 6th St.
MINNEAPOLIS 15, Minn.—Vincent Brass & Copper Co. 124 Twelfth Ave., So.
NEW ORLEANS 12, La.—Metal Goods Corp., 432 Julia St.
NEWPORT NEWS, Va.—Noland Co., 27th St. & Virginia Ave.
NEW YORK 12, N. Y.—Nielsen Hydraulic Equipment, Inc. 298 Lafayette St.
NEW YORK 14, N. Y.—Whitehead Metal Products Co. 303 West 10th St.
PHILADELPHIA 40, Pa.—Whitehead Metal Products Co. 1955 Hunting Park Ave.
PITTSBURGH 33, Pa.—Williams & Co., 901 Pennsylvania Ave.
PORTLAND 10, Ore.—Hydraulic Power Equipment Co. 2316 N. W. Savier St.
ROANOKE 10, Va.—Noland Company, 11 Salem Ave.
ROCKFORD, Ill.—Rockford Tool & Transmission Co. 802 Broadway
SAN FRANCISCO 3, Cal.—General Machinery & Sup. Co. 1346 Folsom St.
SEATTLE 9, Wash.—Palmer Supply Co., 222 Westlake, N.
SHREVEPORT, La.—Standard Brass & Mfg. Co. 1557 Texas Ave.
ST. LOUIS 15, Mo.—Metal Goods Corp., 5239 Brown Ave.
SYRACUSE 4, N. Y.—Whitehead Metal Products Co. 207 W. Taylor St.
TOLEDO 2, O.—Williams & Co., 650 E. Woodruff Ave.
TULSA, Okla.—Ardun Supply Co., 317 S. Detroit
TULSA 3, Okla.—Metal Goods Corp., 302 North Boston
CANADA—Railway & Power Engineering Corp. Ltd.
EXPORT—Mercator Corp., 438 Walnut St., Reading, Pa.

Free NEW CATALOGS

Begins on page B-108

stallation photos. The Silent Glow Oil Burner Corp.

72 Air Handling
Sections on air handling, air cleaning, and air conditioning equipment. Includes application and engineering data. Catalog No. 600. Westinghouse Electric Corp.

73 Warm Air Furnaces
They answer heating requirements from 380,000 to 3,800,000 Btu. output per hour. Specs on oil and gas models, dimension chart. Bulletin No. PR-2. Jackson & Church Co.

74 Heat Transfer Products
Loose-leaf notebook contains collection of bulletins on air conditioning units, coils, unit heaters, and other equipment. Selection, application data. More than 100 pages. Young Radiator Co.

75 Heating Units
Tells how to select and use electric heating units. Charts and tables, hints on installation. 50 pages. Catalog No. 50. Edwin L. Wiegand Co.

76 Air Conditioner
A 6-page folder on several models of air conditioning units illustrated and described here. Capacity charts, specs. Brunner Mfg. Co.

77 Fans, Ventilators
Several bulletins in this package on power roof ventilators, vaneaxial, axial flow, and direct drive fans. How to select and install. 48 pages in all. Robbins & Myers, Inc.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

HOW TO CUT BELOW-ROOF HEAT 13° to 26°

immediately!

Brush or spray on Tropical Roof Coolerant and *feel* the difference at once! This non-staining, bright metallic coating reflects up to 70% radiant heat away from the roof, cuts below-roof temperature up to 26° to give hot-weather comfort. Anyone can apply Tropical Roof Coolerant quickly, easily, at low cost. Do it NOW!

LENGTHENS ROOF LIFE, TOO!

Bright, seamless Roof Coolerant metallic shield prevents drying action of summer heat, keeps roof flexible, prevents cracks and leaks. Adds years to roof life!

FREE! Complete information, literature, on Tropical Roof Coolerant for comfort and roof protection THIS SUMMER. Write today!

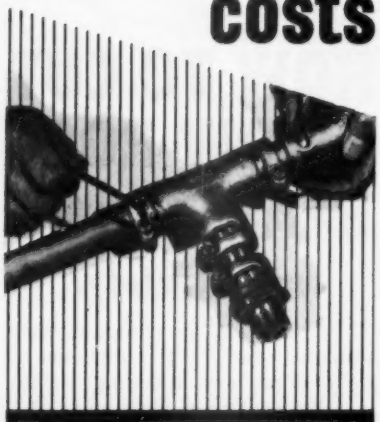
THE TROPICAL PAINT & OIL CO.
1122-1242 W. 70th, Cleveland 2, O.

Heavy-Duty Maintenance Paints Since 1883

TROPICAL

Subsidiary of Parker Rust Proof Company

Saves on installation costs



Quikupl®

This remarkable stainless steel fitting permits quick assembly of pipe or tube without threading, flaring or welding. It cuts installation time way down, because it requires no special tools and no special skills. For the full story get your free copy of Bulletin QF100

COOPER ALLOY
THE COOPER ALLOY FOUNDRY CO. • HILLSIDE, N. J.
Los Angeles San Francisco Portland Boston Chicago Detroit Philadelphia Hartford
Leading producers of STAINLESS STEEL valves, fittings and castings

Please send a copy of Bulletin QF100 to:

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____

Free NEW CATALOGS

Begins on page B-108

78 Roof Ventilators
A collection of bulletins on many types of maker's roof ventilators. Tells how to use each, illustrates models. Charts and tables. About 70 pages in all. The Burt Mfg. Co.

79 Ventilators
Construction details, capacities, and how-it-works information on roof ventilators. DeBothezat Fans Div., American Machine & Metals, Inc.

80 Fans & Blowers
Selection data on fans, blowers, floor ventilators, other products in this 64-page catalog. Installation, maintenance, and engineering information included. Hartzell Propeller Fan Co.

81 Dust & Fume Control
Lists advantages of maker's equipment, tells how to use it in solving plant problems. Specs and engineering data. 36 pages. Catalog No. 72-B. American Wheelabrator & Equipment Corp.

82 Dust Control
Here's a catalog that shows you a full line of equipment for dust control and recovery. Application, operation data included. 40 pages. Catalog No. 800. Dracco Corp.

83 Dust Control
This 24-page catalog (No. 98) tells why your plant needs dust control. Gives details on dust filters, explains how they work. The W. W. Sly Mfg. Co.

84 Hot Water Heaters
Here's a 56-page catalog (No. 35-78) on equipment for

To get these catalogs, circle number on reader's service postcard next to back cover.

Saves on dis-assembly costs

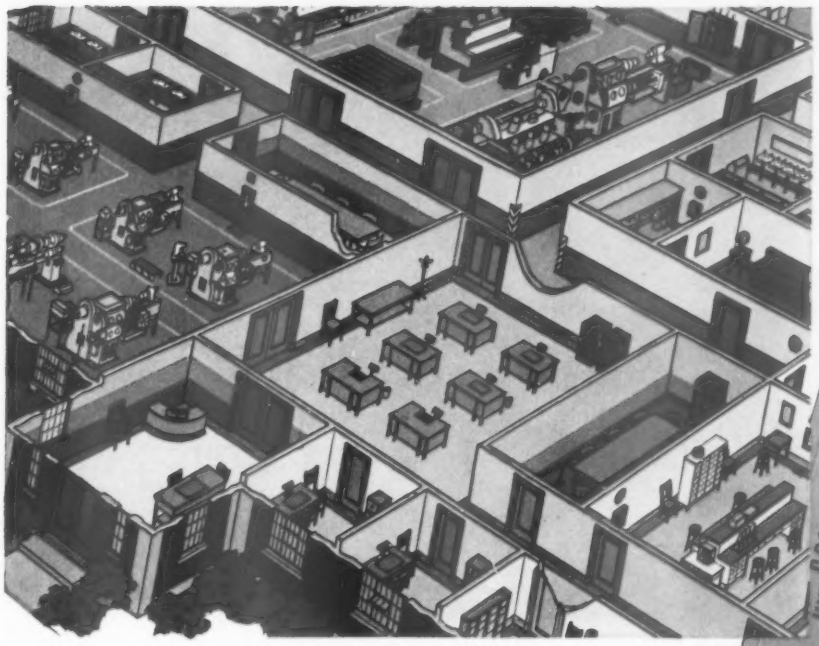
Quikupl®

Thanks to this remarkable stainless steel fitting, a simple turn of an Allen wrench is all that is needed to disassemble your lines for cleaning, rearrangement or replacement. No cutting of welds, no tearing of threads . . . Quikupl goes on or off with ease and without destructive measures. Get the facts today.

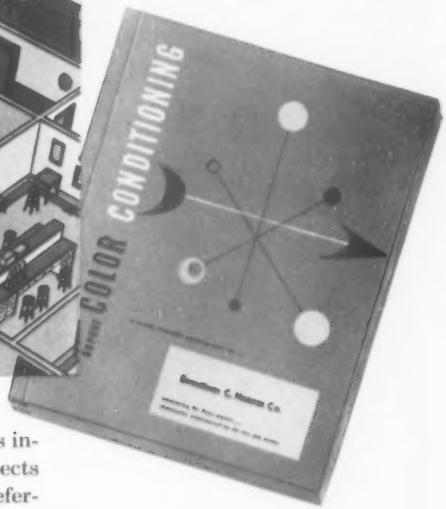
For the full story send for your free copy of Bulletin QF100

COOPER ALLOY
THE COOPER ALLOY FOUNDRY CO.
HILLSIDE, N. J.

NOW... get a FREE SCIENTIFIC COLOR SURVEY of YOUR PLANT!



Complete Specifications the Right Colors and the Right Paints in the Right Places...



At no more than the cost of ordinary maintenance painting, your plant can enjoy the benefits of Du Pont Color Conditioning. A Du Pont paint specialist will make a custom color survey of all your buildings, show you how applying these scientific principles of color and light can pay off for you, as they have paid off in thousands of other installations.

In factories, office buildings, schools and hospitals, Color Conditioning provides better visibility . . . helps raise standards of efficiency, safety and morale. In stores, restaurants, hotels and apartments, Color Conditioning takes into account the psychological aspects of color and universal color preferences to attract patronage . . . stimulate traffic . . . sell more merchandise.

Why not see for yourself what Color Conditioning can do? After a Du Pont paint expert makes a thorough study of your plant, he will present to you complete color recommendations—plus specifications on the right type of finish to be used on every surface. For further information, mail the coupon below.

Made by a Du Pont Paint Expert for every area in your establishment

Personalized painting recommendations submitted in this portfolio at no cost or obligation to you.

DU PONT PAINTS

Chemically Engineered to do the job better

DU PONT

REG. U.S. PAT. OFF.

Better Things for Better Living...*through Chemistry*

E. I. du Pont de Nemours & Co. (Inc.)
Finishes Division, Dept. F-35, Wilmington, Del.

I'm interested in having you make a color survey of our ☐ industrial plant; ☐ hospital; ☐ hotel or apartment building; ☐ school; ☐ restaurant; ☐ store; ☐ office building. Please have a Du Pont maintenance-painting expert arrange for an appointment.
(*Offer not good outside continental United States*)

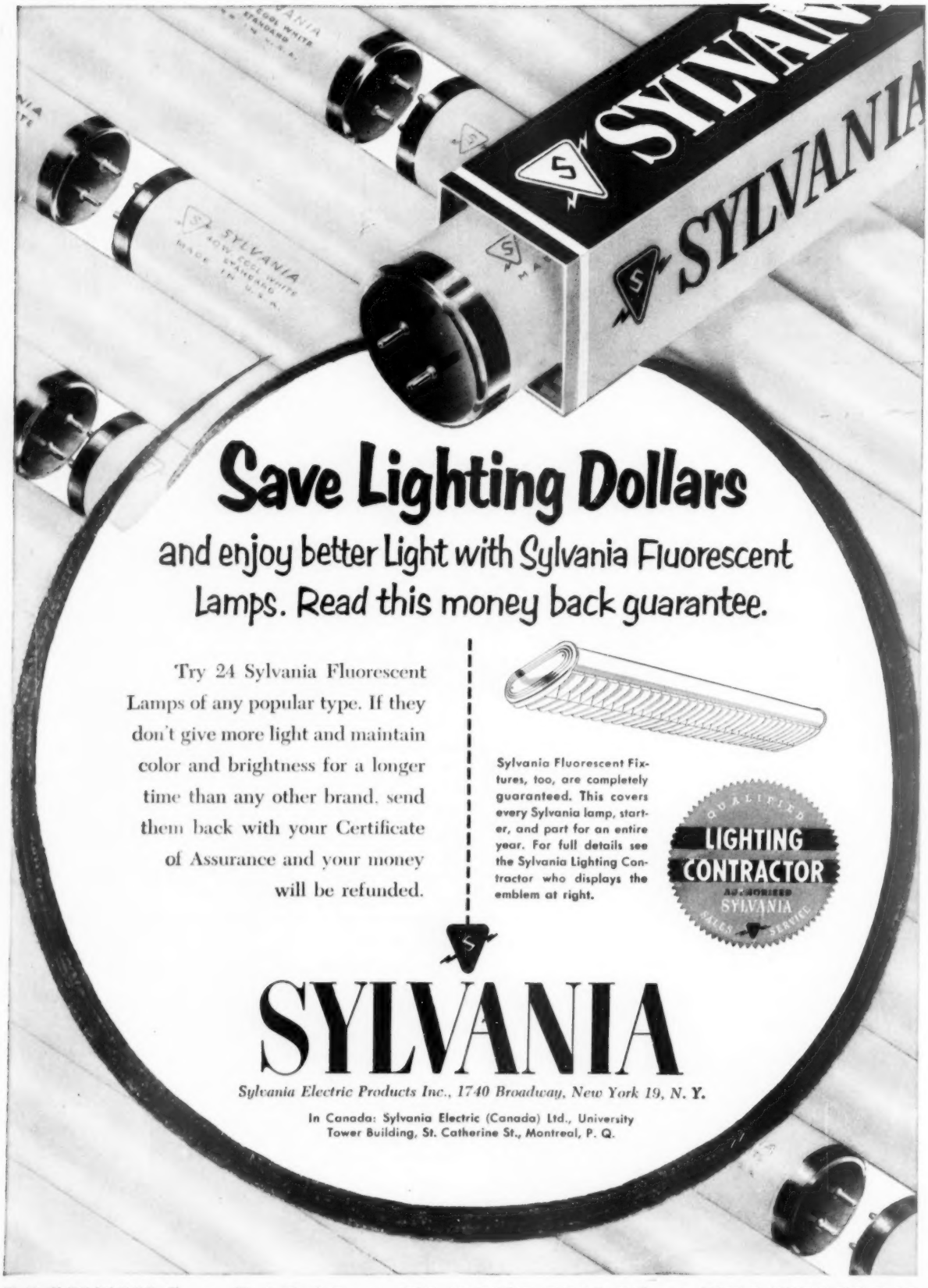
Name_____

Title_____

Firm_____

Address_____

City and State_____



Save Lighting Dollars

and enjoy better Light with Sylvania Fluorescent Lamps. Read this money back guarantee.

Try 24 Sylvania Fluorescent Lamps of any popular type. If they don't give more light and maintain color and brightness for a longer time than any other brand, send them back with your Certificate of Assurance and your money will be refunded.

Sylvania Fluorescent Fixtures, too, are completely guaranteed. This covers every Sylvania lamp, starter, and part for an entire year. For full details see the Sylvania Lighting Contractor who displays the emblem at right.

QUALIFIED LIGHTING CONTRACTOR AUTHORIZED SYLVANIA SALES SERVICE

SYLVANIA

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

In Canada: Sylvania Electric (Canada) Ltd., University Tower Building, St. Catherine St., Montreal, P. Q.

LIGHTING • RADIO • ELECTRONICS • TELEVISION

Up to 10 can wash simultaneously

for MODERN, SANITARY WASH FIXTURES and SHOWERS

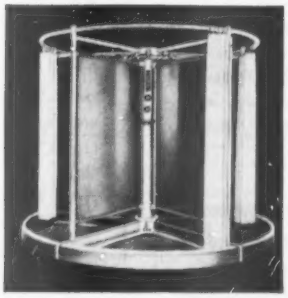
Semi-Circular, Wall-Type Washfountains

Duo (two person) Washfountain, White or Forest Green

SPECIFY BRADLEYS

- ***Maximum Sanitation***
- ***Economy***
- ***Preferred by Factories, Mills, Institutions, Schools***

5-Stall Bradley Shower



During the past 30 years, Bradleys have become recognized as providing economical, adequate and top sanitary washing facilities. Bradley Washfountains serve clean running water from a central sprayhead to groups up to 10 washing simultaneously. The self-flushing bowl prevents collection of contaminating water and with foot-control, faucets and faucet contacts are eliminated. Space is saved, water consumption cut 70%, and piping connections 80%.

Bradley Multi-person Shower Units are compact, easily installed and require only two water connections (hot and cold) and one drain for up to five stalls.

If your washing facilities are not modern or adequate, let a Bradley man make a recommendation now.

Bradley Shower without partitions

Write for Complete Catalog 5204

BRADLEY WASHFOUNTAIN CO.
2215 W. MICHIGAN STREET • MILWAUKEE 1, WISCONSIN

BRADLEY washfountains and showers

Distributed Through Plumbing Wholesalers

Put Safety Brakes On Your Floors

with **VES-COTE**
FLOOR WAX

There is new safety in walking when floors are finished with Ves-Cote . . . because Ves-Cote contains a new and proven anti-slip agent, DuPont's "Ludox"* colloidal silica. These minute particles of "Ludox"* create excellent sole and heel traction—offer effective braking action for each step.

In addition to safety, Ves-Cote dries to a high lustre; is long-wearing; water resistant; easy to apply and dries quickly.

If you need safe floors, yet demand attractive floors—Ves-Cote is your answer.

*Trademark of E. I. Du Pont de Nemours & Co., Inc.

ANTI-SLIP PROTECTION

When you step on Ves-Cote, the weight of the foot forces the hard "Ludox" colloidal silica spheres into the wax particles, providing superior braking action. This way, Ves-Cote gives greater slip protection.

VESTAL ELECTRIC FLOOR MACHINE
Scrubs and polishes faster. Easy to operate. Safe. Exceptionally quiet. Sturdy, perfectly balanced construction.

BRITEN-ALL
A highly concentrated liquid cleaning compound for floors and woodwork. Briten-All is a neutral floor cleaner that cleans better, safer, easier—at lower cost.

Mail This Coupon TODAY!

VESTAL, INC., 4963 Manchester, St. Louis 10, Mo. Dept. F
☐ Have your Vestal representative demonstrate VES-COTE for me.
☐ Send me a FREE copy of FLOOR FACTS—A guide for treatment and maintenance of all types of floors.

NAME .....
ADDRESS .....
CITY ..... STATE .....

VESTAL
INCORPORATED
4963 Manchester
St. Louis 10, Mo.

Free NEW CATALOGS

Begins on page B-108

instantaneous supply of hot water. How to select, how it works. Capacity tables included. American District Steam Co., Inc.

85 Refrigeration
This 14-page catalog shows you many ways to use air conditioning and refrigeration in your plant. E. I. du Pont de Nemours & Co., Inc., Kinetic Chemicals Div.

86 Coils
Direct expansion, water, and steam coils are illustrated and described in Bulletin No. 705. Tells when to use each, gives construction details on the equipment. 8 pages. Bush Mfg. Co.

87 Expansion Joints
This 8-page catalog on rubber expansion joints tells you how they're made, what they can do, and how to select them. Dimension tables, photographs. The Garlock Packing Co.

88 Pipe & Fittings
A root-proof series of sewer pipe and fittings is illustrated and described in this 12-pager (No. 306). Tells where to use and how to install each type. Orangeburg Mfg. Co., Inc.

89 Air & Gas Line Filter
Folder on a mechanical cleaner said to remove 92% of oil, moisture, and dirt from compressed air and gas lines. Describes operation, lists applications. Logan Engineering Co.

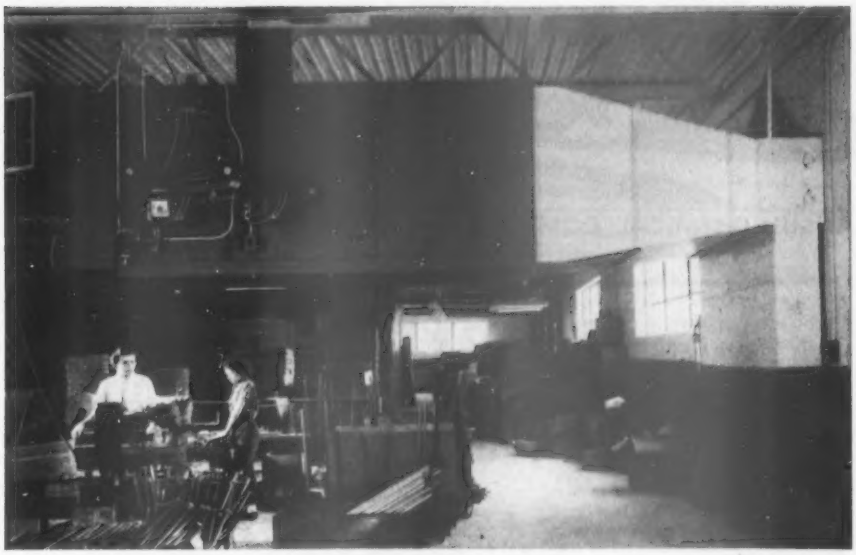
90 Valves
Recommended uses and specifications for a full line of valves in this 72-page cloth-

To get these catalogs, circle number on reader's service postcard next to back cover.

PROOF AGAIN THAT J-C HEATING EQUIPMENT

LEADS THE WAY . . .

NEW PLANT USES FOUR J-C 1,000,000 BTU OUTPUT SUSPENSION FURNACES



Note how installation of a J-C 1,000,000 BTU output suspension furnace saves valuable working space in the new, ultra-modern plant of Leigh Building Products, Division of Air Control Products Inc. located outside of Coopersville, Michigan.

. . . *largest ever specifically designed for overhead installation*

When officials of Air Control Products, Inc. planned a new plant for their Leigh Building Products Division, they were faced with a difficult heating and ventilating problem. But, they did as so many others are doing — they contacted Jackson & Church engineers. **The problem was to heat the plant's 43,500 square feet of manufacturing space and replenish nearly 50,000 c.f.m. of air.**

J-C engineers planned and supervised the installation of four 1,000,000 BTU output suspension furnaces. These J-C units are now operating successfully to replace the unusually large amount of exhausted air while still maintaining a comfortable and steady room temperature.

The Jackson & Church Furnace Line includes the Suspension Series with outputs of 80,000 to 1,000,000 Btu, the Poweraire Series with outputs of 152,000 to 320,000 Btu, the Powerated Series with outputs of 380,000 to 3,800,000 Btu.

JACKSON & CHURCH CO. SAGINAW, MICHIGAN

J-C

Work well done since eighty-one

ANSUL CHEMICAL COMPANY • MARINETTE, WISCONSIN

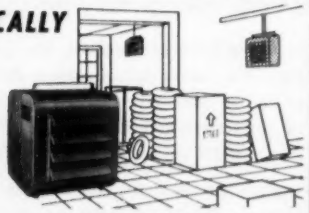
SEE PAGE B-158

COLD SPOTS
Converted TO AREAS OF
PRODUCTION-COMFORT
with
ELECTROMODE
All-Electric UNIT HEATERS

SUSPENSION TYPE MODELS available from 10 to 45,000 watts. Model 14-10 illustrated.

QUICKLY — EASILY — ECONOMICALLY

- Locate wherever heat is needed.
- No piping, flues or fuel storage required.
- Install and heat within one day.
- All current entering unit is converted into heat. No fuel loss en route.
- Models from 1500 to 45,000 watts to fit any heating need.



COMBINATION PORTABLE and suspension type models, 1500 to 7500 watts. Model AN-30A illustrated.

EXPLOSION-PROOF HEATERS for heating hazardous areas subject to explosion. In three sizes: 2000, 4000, 6000 watts. Model CX-2 illustrated.

Completely SAFE! Only Electromode has the cast-aluminum, sealed-in heating element and built-in safety switch. No danger of fire, shock or burn. No over-heating.

Approved by Underwriters' Laboratories

For complete information write:

ELECTROMODE CORPORATION
45 CROUCH ST. ROCHESTER 3, N. Y.

Leader in electric heaters since 1929

Free NEW CATALOGS

Begins on page B-108

bound book. Engineering data section. Catalog No. 56. Ohio Brass Co.

91 Valves & Fittings
Catalogs on stainless steel valves, fittings, and accessories. Specs, reference charts, application data in this file folder. Cooper Alloy Foundry Co.

92 Valves
This 36-page catalog tells you how to use diaphragm valves for corrosive, volatile, or viscous materials. Selection and maintenance information. Catalog No. V-52. Hills-McCanna Co.

93 Valves
In catalog No. 63 you'll find specs, dimensions, and engineering information on a line of valves, pipe fittings, and fire hydrants. 239 pages. The Kennedy Valve Mfg. Co.

94 Valves
In Bulletin No. E-160 you learn about maker's valves for general services. Selection chart, how-it-works-data, specs, and dimensions. 14 pages. Everlasting Valve Co.

95 Automatic Valves
How to select and use maker's valves, strainers, and controls is subject of this 32-pager (No. D-15). A. W. Cash Valve Mfg. Corp.

96 Filters
Four bulletins on a line of pipeline filters, liquid filters, and electronic precipitators. Tells how each works, outlines applications. 30 pages. Dollinger Corp.

Turn the page

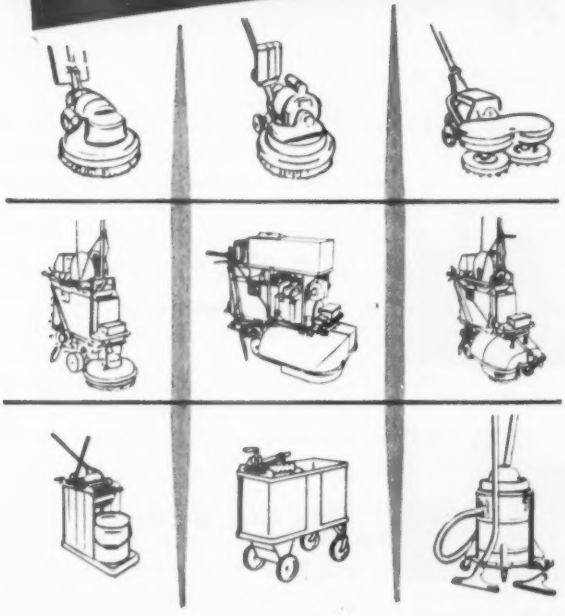
To get these catalogs, circle number on reader's service postcard next to back cover.

Keep your floor-maintenance men happy . . .

with *Job-Fitted* EQUIPMENT!

Choose from the COMPLETE *Finnell* Line

More than a score of models and sizes permits selection of the equipment that's exactly right for your job!



However much a maintenance man may want to do a good job, and at the same time show savings in labor costs, he's *stymied* if the machine is too small, or too large, or is otherwise unsuited to the job. Different floors and areas call for different care and equipment. That's why *Finnell makes more than a score of floor-maintenance machines.* From this complete line, it is possible to choose equipment that is correct in size as well as model . . . that provides the maximum brush coverage consistent with the area and arrangement of the floors.

Finnell makes *Conventional Polishing-Scrubbing Machines* in both concentrated and divided-weight types, each in a full range of sizes . . . a *Dry-Scrubber*, with self-sharpening brushes, for cleaning grease-caked floors . . . *Combination Scrubber-Vac Machines* for small, vast, and intermediate operations, including gasoline as well as electric models . . . *Mop Trucks* . . . *Vacuum Cleaners* for wet and dry pick-up, including a model with By-Pass Motor. In addition, *Finnell* makes a full line of fast-acting *Cleansers* for machine-scrubbing . . . *Sealers* and *Waxes* of every requisite type . . . *Steel-Wool Pads*, and other accessories — *everything for floor care!*

In keeping with the *Finnell* policy of rendering an individualized service, *Finnell maintains a nation-wide staff of floor specialists and engineers. There's a Finnell man near you* to help solve your particular floor-maintenance problems . . . to train your operators in the proper use of *Finnell Job-Fitted Equipment and Supplies* . . . and to make periodic check-ups. For consultation, demonstration, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2505 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

50th Anniversary — Everything for Floor Care — FINNELL

BRANCHES IN ALL PRINCIPAL CITIES

NEW ...and built for YEARS of service!

IN 24 SECONDS one man can tilt and dump fully loaded dirt hopper.

CAR-TYPE FEATURES, like automotive steering, allow fast easy handling. Note rugged construction.

TENNANT MODEL 75 POWER SWEEPER

Here's a sweeper built to *keep paying for itself for years*—the new fast-sweeping TENNANT Model 75.

Use it on tough round-the-clock jobs and see the difference that *heavy-duty* design makes. Fast, clean sweeping . . . quick dumping . . . and extra *years* of service with minimum downtime.

1 **SWEEPS FASTER.** Top capacity exceeds 100,000 sq. ft. per hour (with sidebrush and 6" overlap). Safe; drives like a car. Does clean job.

2 **DUMPS MECHANICALLY.** Ratchet lever dumps fully loaded hopper in 24 seconds or less. Saves time; operators like it. Easy to use.

3 **HIGHLY MANEUVERABLE.** Turns in only 60" radius (with or without sidebrush). Has instant reverse, rear wheel steering, positive braking action. Saves valuable time.

4 **HANDLES BULKY DEBRIS.** Over 11" front clearance of frame. For easier pickup of cartons, sweeping ramps, etc. *Write for details.*

ELECTRIC sweeper is quiet, economical. Write for special bulletin.

COMPACT 29" wide sweeper (Model 24) has many uses, does fast, clean job.

TENNANT Established 1870

G. H. TENNANT CO.
2534 N. 2nd Street
Minneapolis 11, Minn.

Offices in Principal Cities

INDUSTRIAL FLOOR MACHINES

CREATORS OF THE TENNANT SYSTEM OF FLOOR MAINTENANCE—MANUFACTURERS OF EQUIPMENT AND MATERIALS FOR MAINTENANCE OF FLOORS, DECKS, ROOFS, HIGHWAYS

Free NEW CATALOGS

Begins on page B-108

97 Steam Traps
Catalog No. J. is a combination steam trap catalog and maintenance-installation manual. How to select and use maker's equipment. 44 pages. Armstrong Machine Works.

98 Compressors
Several models of air compressors outlined in this 12-pager (No. 300). Features, specs, performance data for each. Quincy Compressor Co.

99 Pumps
"How to Solve Pumping Problems" is subject of this 36-page manual. Sample problems and technical data included. Index. Geo. D. Roper Corp.

100 Steam Generators
In Bulletin No. 1050 you'll find the complete story on maker's steam generators. Describes components, gives dimensions, lists specs. 8 pages. Ames Iron Works.

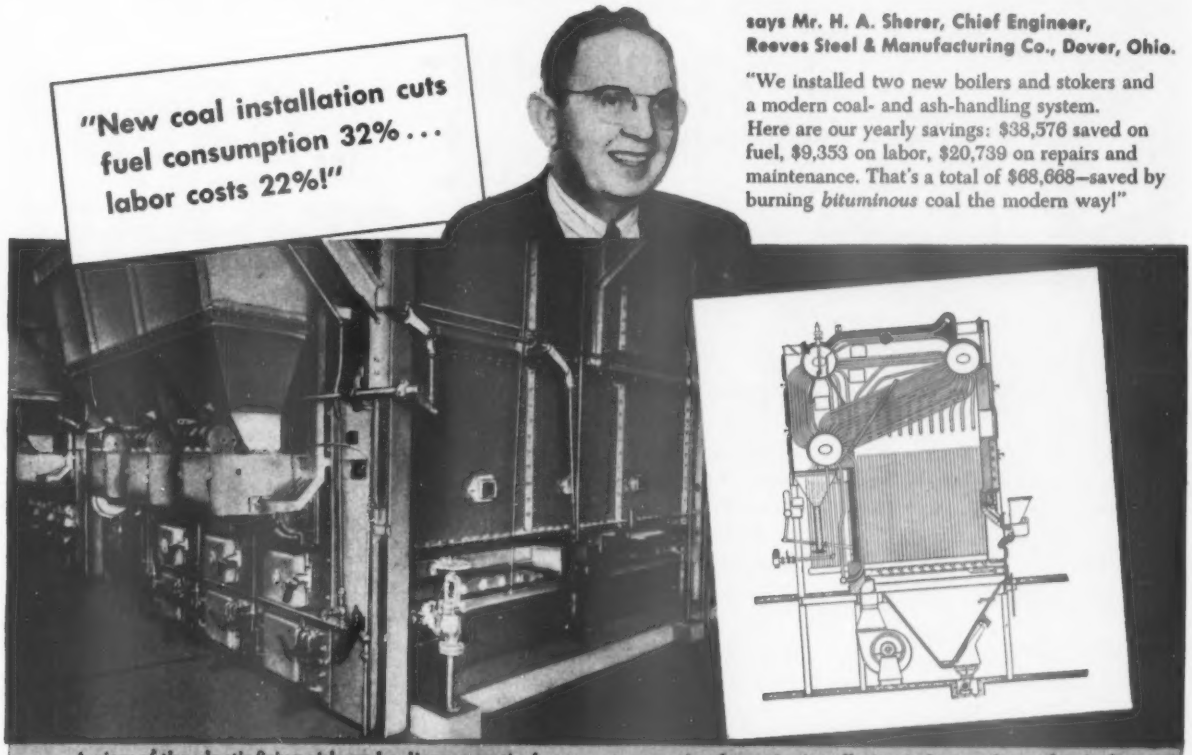
101 Boilers
Tells how to use a line of self-contained boilers for heating and processing. Gives typical applications, describes operation. Design and selection data. Cleaver-Brooks Co.

102 Absorbents
Group of bulletins shows how you can use maker's absorbents to remove the danger of spilled oils, grease, paints, and liquids. Oil-Dri-Corp. of America.

103 Floor Matting
Many kinds of matting illustrated and described in this collection of bulletins. Applica-

To get these catalogs, circle number on reader's service postcard next to back cover.

"WE SAVE OVER $68,000 A YEAR— BY BURNING COAL THE MODERN WAY!"



says Mr. H. A. Sherer, Chief Engineer, Reeves Steel & Manufacturing Co., Dover, Ohio.

"We installed two new boilers and stokers and a modern coal- and ash-handling system. Here are our yearly savings: $38,576 saved on fuel, $9,353 on labor, $20,739 on repairs and maintenance. That's a total of $68,668—saved by burning *bituminous* coal the modern way!"

A view of the plant's firing aisle and a diagrammatic drawing of one of the boilers. It now costs 18.8¢ less to generate every thousand lbs. of steam. This is a saving large enough to amortize the entire installation in 3 years-3 months. And that includes all the cost incurred in tearing out old equipment and constructing a new plant floor!

● Today, *bituminous* coal's inherent economy has been greatly increased. Modern combustion installations give you more steam for every dollar . . . automatic coal- and ash-handling systems cut labor costs to a minimum.

A consulting engineer can show you how coal can do a better job—*and save you real money*—in a plant designed to meet your *specific* needs.

In addition, with coal you get the basic advantages of price stability, and dependable supply. These advantages are assured by America's virtually inexhaustible coal reserves and the high productivity of America's coal industry.

If you operate a steam plant, you can't afford to ignore these facts!

COAL in most places is today's lowest cost fuel.

COAL resources in America are adequate for all needs—*for hundreds of years to come.*

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

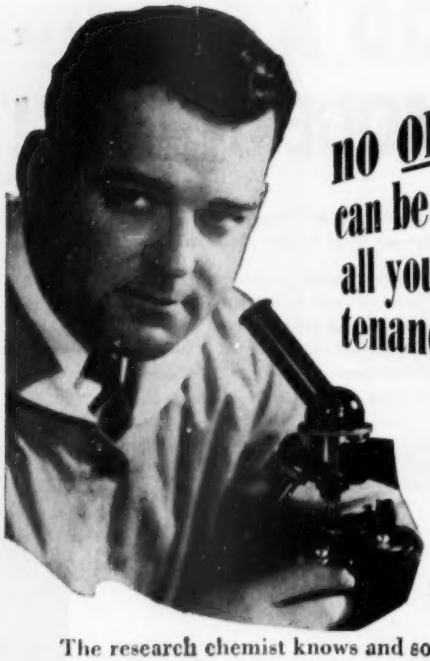
COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association, Washington, D. C.

FOR HIGH EFFICIENCY FOR LOW COST

YOU CAN COUNT ON COAL!



no one paint can be a cure-all for all your paint maintenance problems!

One medicine can't cure all ailments. One size shirt can't fit all men. And it's just as impossible for one paint product to answer all your paint maintenance needs.

The research chemist knows and so does the experienced maintenance engineer that the typical industrial plant presents many varied maintenance problems. In one instance the problem may be to find a protective finish which has maximum acid resistance. Moisture may be the chief concern in another quarter. Or perhaps it's mold and mildew prevention . . . or heat resistance . . . or the retarding of rust.

The best and easiest way for you to cut maintenance costs is to be sure you use special protective finishes made to cope with the particular problems you encounter in your plant. If you want the *best* in specific industrial paint products—and the best is always the cheapest in the long run — insist on VALDURA *Heavy Duty* Maintenance Paints. There's a *specific* VALDURA Heavy Duty Maintenance Paint for every recognized industrial need. If you've got a *special* problem VALDURA'S Technical Service Department is available to you without charge.

Check the convenient reply coupon and VALDURA will be *at your service* — immediately!

For further information just attach this coupon to your business letterhead and mail to VALDURA, 101 East Ontario Street, Chicago 11, Illinois.

☐ Please have your representative call.
☐ Please have a technical expert call to give advice on special problem.

Send information on—

☐ Moist Bond Paints for painting over surface moisture.
☐ Acid Resistant Paints.
☐ High Heat Paints.
☐ Rust Retardant Paints for painting over rusted surfaces.
☐ _____ Indicate any other type of paint you are interested in.

VALDURA

Heavy Duty Maintenance Paints

VALDURA DIVISION • AMERICAN-MARIETTA CO. • 101 E. ONTARIO ST., CHICAGO 11, ILL.

NEW Free CATALOGS

Begins on page B-108

tion data, construction details. American Mat Corp.

104 Floor Maintenance
A stack of bulletins, 70 pages in all—on floor, sash, and roof maintenance. Describes how to use maker's products for each type of job. Tremco Mfg. Co.

105 Flooring
There's information on a heavy-duty industrial flooring in this 8-page bulletin (No. 653). You learn what it is, where it's being used, and how it can reduce maintenance costs. Walter Maguire Co., Inc.

106 Floor Maintenance
Here's information on a full line of waxes, sealers, and cleansers. Describes applications for each. 20 pages. Catalog No. CB-1. Finnell System, Inc.

107 Floor Maintenance
"Proper Care of Floors" is title of this 32-page catalog. Tells how to seal, clean, and maintain floors, gives specs on line of products. West Disinfecting Co.

108 Floor Maintenance
A 40-page pocket-size catalog gives directions for care of many types of floors under specified conditions. Do's and don't's and selection charts. Multi-Clean Products, Inc.

109 Floor Maintenance
This folder on floor maintenance machines, power sweepers, and maintenances systems tells how to clean any kind of floor. Specs and operating information. G. H. Tennant Co.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

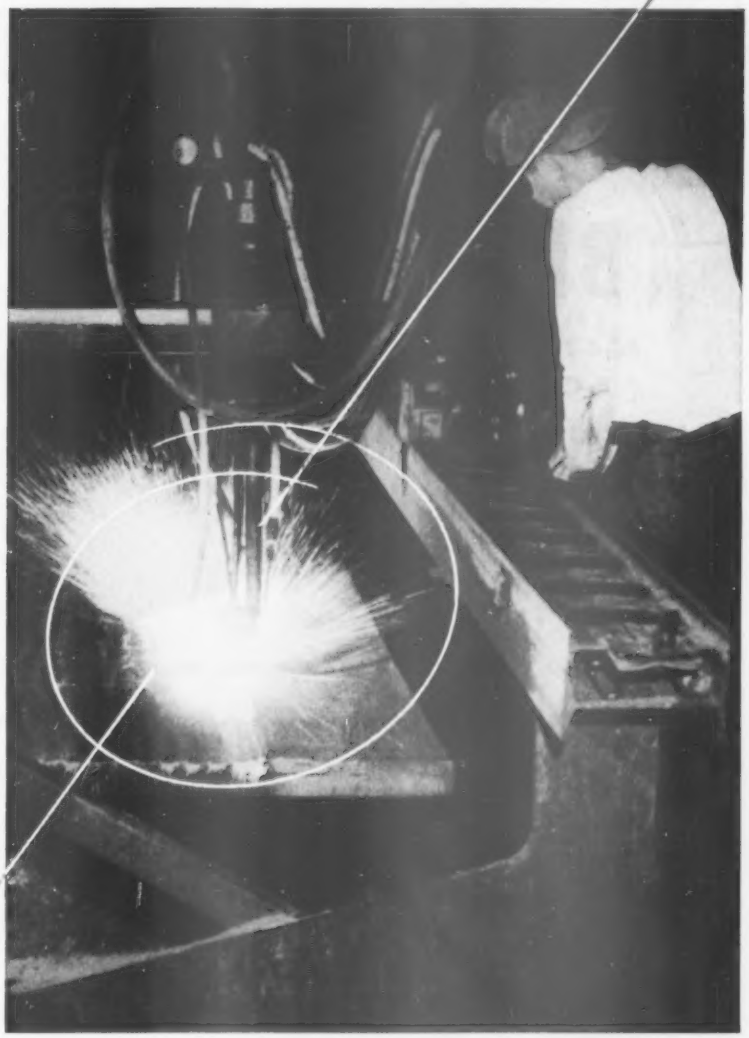
How Oxygen...and LINDE SERVICE*

SAVED $700,000 FOR ONE STEEL COMPANY

"Burning the unburnable" was the problem that faced producers of stainless steel. This steel resisted scarfing and cutting—even with the intense heat of the oxy-acetylene flame.

Doing this work by mechanical methods meant sky-high costs. But that looked like the only answer—until LINDE SERVICE took a hand with the problem.

Working in the laboratory and in the field, LINDE engineers developed powder cutting and scarfing. By adding powdered metal to the oxygen flame, stainless steel was scarfed and cut with ease and speed.



LINDE SERVICE IN ACTION! Powder cutting is saving this company alone over $700,000 per year in the production of stainless steel. And they're making a better product.

This is but one example of how LINDE customers are saving millions of dollars each year through LINDE SERVICE. If you use oxygen, let us tell you how LINDE SERVICE can save you time and money, too.

* **LINDE SERVICE** is the unique combination of research, engineering, and over 40 years of accumulated know-how that is helping LINDE customers save money and improve production in their uses of oxygen and oxy-acetylene processes.

Linde
Trade-Mark

LINDE AIR PRODUCTS COMPANY

A Division of UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC New York 17, N. Y.

In Canada: Dominion Oxygen Company, Limited, Toronto

Here's how to get that EXTRA in cost savings and operating efficiency

BRULÉ

FG4-T5 Patented
PACKAGED

INCINERATORS

SIMPLIFIED TRASH BURNING BECAUSE OF SERVICE-PROVED FEATURES

- **AIR COOLED WALLS:** Keeps walls cool. Preheats combustion air. Increases efficiency.
- **SECONDARY AIR INTAKES:** Insures complete combustion. Keeps flue gases below 700° F.
- **BRICKWORK:** The brickwork in the trash burner is entirely suspended. This frees walls from mechanical strain—has double the usual life expectancy.
- **CHARGING DOOR:** Makes feeding easy. Operator does not need asbestos apron. No burning embers or hot ashes can fall out of door.
- **BRULE STEP AND FLAT GRATES:** Assures peak fire chamber temperatures. Eliminates stoking.
- **THREE CHAMBERS:** The firing chamber into which the wastes are charged. Combustion chamber in which complete combustion occurs and in which fly ash separates out. The upper chamber which assures ultimate completion of combustion.
- **SIZE AND WEIGHT:** Requires a minimum of space. Weight is one-half that of a comparable masonry unit.

INDUSTRIAL INSTALLATIONS

This packaged, portable unit operating on as low as an 18 ft. refractory-lined stack, shipped in two sections for erection. Incinerator and stack readily positioned for same day operation. Simple concrete pad eliminates true foundation. This unit performs without emitting fly ash, soot, sparks, odors. No property contamination. Burns 500 lbs. of usual plant wastes per hour with same reduced to but one pound of ash.

USE THE COUPON to find out how this unit can work for you to cut your costs, save floor space now used for stacking trash, and increase operating efficiency. Ask for name of sales office nearest you.

BRULE INCINERATORS, 407 So. Dearborn St., Chicago 5, Ill.

☐ Please send Bulletin 528 ☐ Name of nearest sales office

Company .....

Your name .....

Address .....

City ..... Zone ..... State .....

Free NEW CATALOGS

Begins on page B-108

110 Floor Finishes
Concrete floor finishes is subject of this 24-page manual. Fundamentals of concrete mixing, instructions on finishing. Section on maintenance. Portland Cement Assn.

111 Cleaning Compound
Here's a digest of 54 maintenance cleaning jobs maker's product can do. Complete how-to-do-it data. 16 pages. Form No. 5463R10. Oakite Products, Inc.

112 Floor Maintenance
You'll find 18 pages on the original treatment and maintenance of floors. Also sections on floor machines, brushes, and accessories. Vestal, Inc.

113 Vacuum Cleaners
Illustrations and descriptions of portable vacuum cleaners. Shows them in action, suggests uses. Bulletin No. 114-F. Spencer Turbine Co.

114 Vacuum Cleaning
Describes dust control equipment. Tells how it works, where to use it, suggests piping layout. A collection of bulletins, 28 pages in all. United States Hoffman Machinery Corp.

115 Fluorescent Fixtures
Large collection of bulletins on area illumination, fluorescent luminaires, and fixtures of many kinds. Application data. 120 pages in all. Smithcraft Lighting Div.

116 Lamps
This 28-page catalog (No. 53-54-E) covers incandescent and fluorescent types. Selection, ap-

To get these catalogs, circle number on reader's service postcard next to back cover.

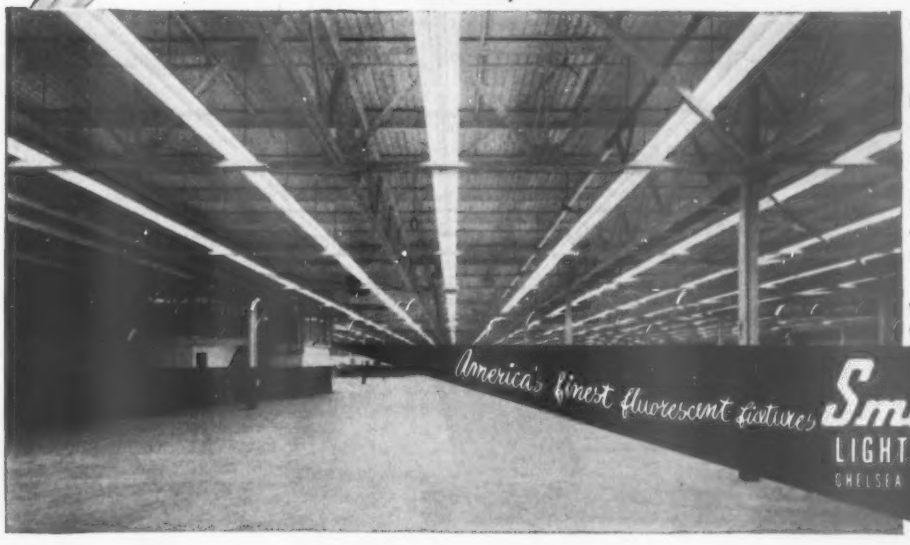
modern production demands of top efficiency

factory lighting

THE SMITHCRAFT A-L-S INDUSTRIAL UNIT

"AMERICA'S LIGHTING STANDARD"

Progressive management knows that quality factory lighting is one of the most productive tools available for American industry. The Smithcraft A.L.S. Industrial Unit is today's outstanding achievement in industrial lighting. 20% uplighting, 30° shielding, 90% efficiency, continuous lines of light . . . to lighting men, these features mean comfortable seeing with a minimum of glare caused by contrasts. To production men, these Smithcraft developments mean increased production, improved quality control, better employee morale and safety.



Continuous row installation in one of the nation's newest and most modern plants . . . over 5000 Smithcraft A.L.S. 8' Industrial Slimline units lighting 397,000 sq. ft. of floor space. Notice the continuous lines of light with no interrupting dark areas between fixtures and how uplighting lights the ceiling reducing contrast.

Write for 4-page folder describing the A.L.S. Industrial Unit.

America's finest fluorescent fixtures

Smithcraft

LIGHTING DIVISION

CHELSEA 50, MASSACHUSETTS

OUT OUR WAY
NO, NOBODY PUSHED ME--IT WAS JUST A SLIPPERY SPOT--THERE WASN'T A SOUL NEAR ME!
THAT JUST GOES T'PROVE HOME-OFFICE GUYS ARE HUMAN AFTER ALL! THEY CAN BANG THEMSELVES UP AS EASY AS US ORDINARY MORTALS!
SOME GOOD OUGHTA COME OF THIS, THOUGH! I'LL BET TH' BOSS HAS A DOZEN BAGS OF SOL-SPEEDI-DRI IN HERE T'MORROW!
VISITING BRASS
J. R. WILLIAMS

Industry's favorite floor "dry cleaner"

SOL-SPEEDI-DRI

No idle statement, that! For industry buys more Sol-Speedi-Dri than any other oil and grease absorbent. That's because pound for pound, dollar for dollar, Sol-Speedi-Dri gives *more for the money*, all factors considered. "Dry cleaning" with Sol-Speedi-Dri is *your* best way to keep floors clean and slip-proof. Send coupon today for free sample and literature.

SPEEDI-DRI CORP. 210 W. Washington Sq., Philadelphia 5, Pa.

Warehouse stocks maintained in principal cities of the United States and Canada.

• • •

Inquirers in New York, New England, and New Jersey should write to Speedi-Dri Corp. Elsewhere in U.S. to Waverly Petroleum Products Co., 1724 Chestnut St., Phila. 3, Pa. In Canada, G. H. Wood & Company Ltd., Toronto. Branches throughout Canada.

FREE SAMPLE Fill out the coupon and mail today for free sample and literature.

Name _____

Address _____

City _____ *State* _____

FMM-8-53

Free NEW CATALOGS

Begins on page B-108

plication, engineering information. Duro-Test Corp.

117 Fluorescent Lamps
More than 100 pages in this collection of bulletins. All you need to know about selection, application, and operation of maker's fluorescent lamps. Sylvania Electric Products, Inc.

118 Group Replacement
File folderful of information on group replacement programs for both incandescent and fluorescent types. Includes lighting maintenance manual for electricians and plant engineers. The Champion Lamp Works.

119 Lighting Fixtures
Here's a pair of bulletins, on fluorescent and incandescent fixtures. Specs and lighting charts for each model. 12 pages. Day-Brite Lighting, Inc.

120 Reflectors
Complete line of lighting reflectors in this 92-page catalog. Specs, illustrations, lighting charts. Applications for each. The Jones Metal Products Co.

121 Lighting
Catalog No. GEA-5670A shows applications for remote control higher voltage lighting circuits. Typical installation sketches, cost comparisons. 12 pages. General Electric Co.

122 Fire Protection
You learn why you need fire protection in this 32-pager. Describes how maker's equipment can protect you. Installation photos. Grinnell Co., Inc.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

Build

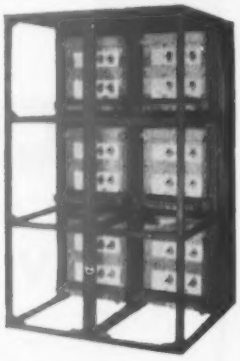
all these things and more with versatile UNISTRUT® METAL FRAMING

UNISTRUT framing and pipe clamps support heavy banks of conduit leading to motors in plant of large pharmaceutical manufacturer.

Load center built with UNISTRUT channel and fittings. Framing system's adjustable feature permits quick location of gear to spot desired.

Photo shows how a large power company used UNISTRUT framing and pipe clamps to rack rows of conduit in steam plant installation.

Framework of UNISTRUT channel and fittings support switch gear in typical cubicle installation.



Rack conduit, cable and pipe—
Frame power load centers—
Mount switches, meters and panelboards

Those who use completely adjustable UNISTRUT metal framing know it's easy to handle and quick to erect—that it provides great strength without bulk—that adjustments, changes and additions are easily made at any time.

The UNISTRUT system cuts costs, too. You save time in engineering detailing and eliminate the need for trained erection crews—anyone can build with UNISTRUT channel and fittings. No drilling, no welding, no special tools or equipment—all you need is a hacksaw and a wrench to build wire and cable reel racks, fluorescent fixture supports, transformer vaults, electric motor mounts, bus duct supports and many other structures. It will pay you to try UNISTRUT framing on your next job.

Basic Components of the UNISTRUT Metal Framing System

UNISTRUT Products are Bonderized

Write for NEW

U. S. Patent Numbers
2327587 2329815 2345650
2363382 2380379 2405631
2541908 Other Patents Pending

Free 84-page Pocket Catalog 800

FOR THE MAN ON THE JOB! 84 pages packed with pictures, drawings, ideas and data on how to frame, rack, mount, suspend and support all kinds of electrical equipment with UNISTRUT channel and fittings.

UNISTRUT

The World's *Most Flexible All-Purpose Metal Framing*

Distributors and Warehouse Stocks in Principal Cities. Consult your Telephone Directories.

UNISTRUT PRODUCTS COMPANY **Dept. FM5**
1013 W. Washington Blvd., Chicago 7, Ill.

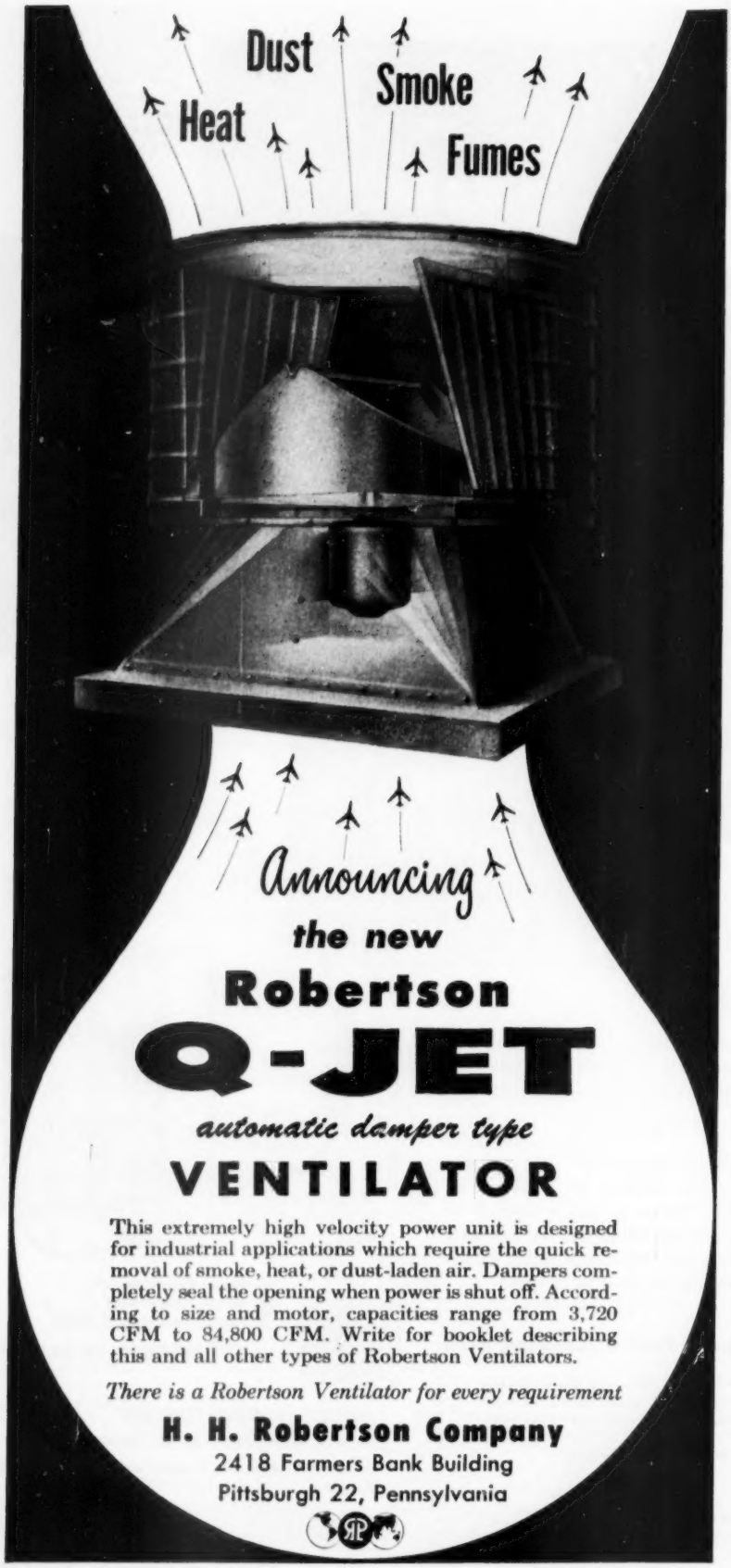
Please send me the new Pocket Catalog No. 800, without obligation.

Name_____

Company_____

Address_____

City_____ Zone____ State_____


Dust
Heat
Smoke
Fumes
Announcing
the new
Robertson
Q-JET
automatic damper type
VENTILATOR
This extremely high velocity power unit is designed for industrial applications which require the quick removal of smoke, heat, or dust-laden air. Dampers completely seal the opening when power is shut off. According to size and motor, capacities range from 3,720 CFM to 84,800 CFM. Write for booklet describing this and all other types of Robertson Ventilators.
There is a Robertson Ventilator for every requirement
H. H. Robertson Company
2418 Farmers Bank Building
Pittsburgh 22, Pennsylvania

Free NEW CATALOGS

Begins on page B-108

123 Fire Protection
Series of bulletins on fire detection and extinguishing equipment. Gives applications, describes operation. 66 pages. Walter Kidde & Co., Inc.

124 Linen Supply
Folder describes how linen supplier can save you money. Outlines the service, lists applications. Linen Supply Assn. of America.

125 Sanitation
A 16-page catalog tells you about methods and materials used in maintenance and sanitation of buildings. Specs and directions for using maker's products. Turco Products, Inc.

126 Waste Receptacle
Here's information on a self-closing waste disposal receptacle. Pictures several size models. Solar-Sturges Mfg. Div., Pressed Steel Car Co., Inc.

127 Water Coolers
You learn how to set up a work center plan for water cooler placement in this 4-pager. Describes maker's water coolers. General Electric Co.

128 Coatings
Describes coatings that check or prevent rust formation. Selection and application tables. Other special purpose coatings. Tnemec Co., Inc.

129 Rust Preventive
How to stop rust is subject of this 16-page catalog. Specs, color chips, and applications for each coating. Rust-Oleum Corp.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

Fluorescent Service Co. finds CERTIFIED BALLASTS best

WILLIAM H. STERN, *President*
Fluorescent Service Company

Fluorescent Service Company, outstanding Washington, D. C., firm specializing in maintenance of fluorescent lighting installations, reports CERTIFIED BALLASTS give the best lighting results.

Mr. William H. Stern, president, says, "I find far fewer ballast troubles and better lighting performance when Certified Ballasts are used and I consider it good practice to install Certified Ballasts whenever replacements are necessary."

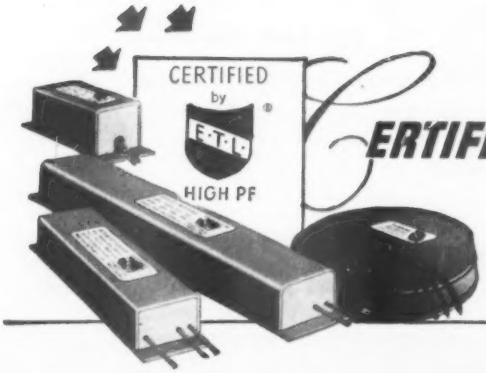
Experience is proving it pays to insist on CERTIFIED BALLASTS because they assure—

Full Lamp Life **Rated Light Output** **Long Ballast Life**

CERTIFIED BALLASTS are made by 10 leading manufacturers to precise specifications, then tested by Electrical Testing Laboratories, Inc., which certifies they conform to these high standards.

Write for complete information on the types of CERTIFIED BALLASTS available from each participating manufacturer.

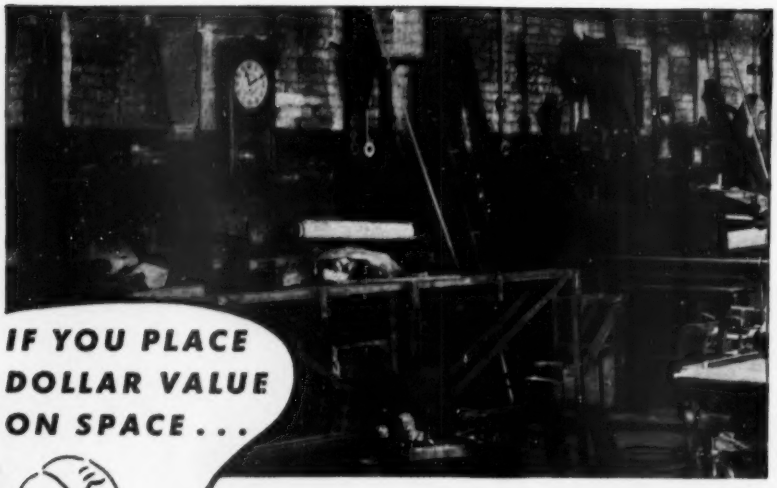
Participation in the CERTIFIED BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.



CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO



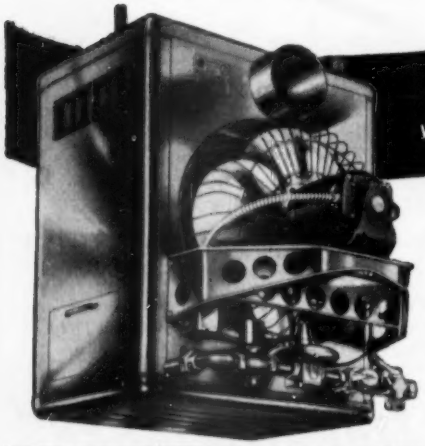
IF YOU PLACE DOLLAR VALUE ON SPACE . . .

Convert waste space to usable space quickly with Reznor suspended gas unit heaters

REZNOR unit heating makes every spot in your plant and on your ground potential production areas . . . all year around. You can block off a section in your big plant and use Reznors and overnight give "shirt sleeve" comfort for office workers. You can put up a shed, any size, for warehousing or other use and with Reznor units quickly make it tenable for workmen.

Why worry and spend for pushing capacity of a central heating plant when Reznor gas units can manufacture and automatically maintain on-the-spot heat. Reznor needs only gas and electricity to completely mechanize the heating job. If you can't extend lines from natural or manufactured gas supply, Liquified Petroleum will serve as well (talk to your Reznor dealer).

Put a Reznor catalog in your file for quick reference. Better yet . . . stock several Reznor units and be ready for instant conversion of idle space to productive plant.



REZNOR
WORLD'S LARGEST SELLING GAS UNIT HEATER

MECHANIZED HEATING

A completely automatic, packaged unit in sizes from 25,000 to 200,000 BTU. Installed singly or in multiples as required. High efficiency due to balanced engineering of heat production, air movement and controls. Both floor and suspended models available.

SEE SWEET'S CATALOG FILE

Write for Catalog

REZNOR MANUFACTURING CO.
46 UNION ST. · MERCER, PENNA.
Send me 20-page catalog in full color

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

Free NEW CATALOGS

Begins on page B-108

130 Maintenance Paints
Several folders illustrate properties and suggest applications for a line of maintenance paints. Tell how to formulate for any application. Naval Stores Dept. Hercules Powder Co.

131 Maintenance Finishes
This 8-page catalog gives maintenance painting specifications for many plant jobs. Selection information indicates which coating to use where. Section on surface preparation. Form No. C-238. The Glidden Co.

132 Building, Maintenance Materials
Form No. 99 is a 72-page handbook on how to use maker's products. Selection data, specs for each item in the line. Truscon Laboratories, Div. of Devoe & Raynolds Co., Inc.

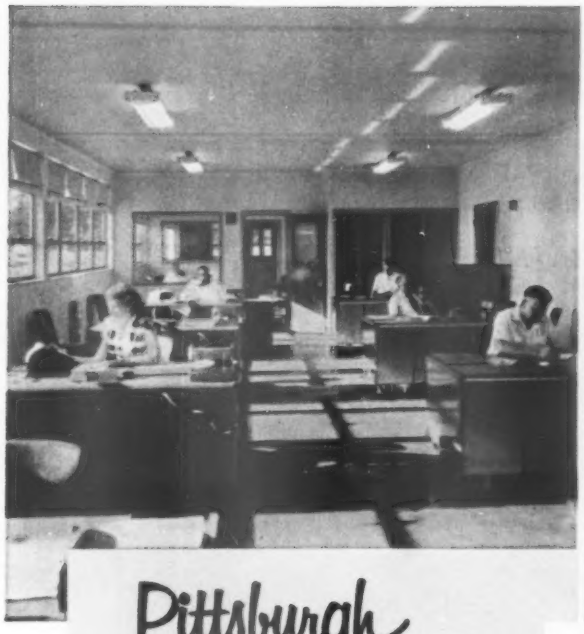
133 Floor Maintenance
Illustrates and describes a complete line of floor maintenance materials. Specs, recommended treatment for many types of plant floors. 48 pages. Hillyard Chemical Co.

134 Steel Shop Equipment
A collection of 11 bulletins brings before you a full line of work benches, stools, and cabinets. Specs, construction details. 72 pages in all. Standard Pressed Steel Co.

135 Shop Equipment
In catalog No. ET-587 there are details on maker's steel boxes, bins, and shelving. Sections on uses, accessories. Berger Mfg. Div., Republic Steel Corp.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.



Pittsburgh COLOR DYNAMICS*

Reduces Eye Fatigue Among Office Workers

Modern painting system effectively uses helpful eye-rest colors to increase efficiency and improve working conditions for clerical and technical staffs.

● Portion of the sales office of the Albion Malleable Iron Company, Albion, Mich., (upper left) and one of the antibiotics laboratories of Parke, Davis & Company, painted according to COLOR DYNAMICS, with restful shades of green on walls and ceilings to lessen eye strain and fatigue.

NEXT TIME you select color for your offices or plant, discard old-fashioned hit-or-miss methods and do it the up-to-date way—with Pittsburgh COLOR DYNAMICS.

● **Today's knowledge** of color confirms the fact that color has the power to stimulate effort, provide comfort, give pleasure.

● **Pittsburgh** has captured and harnessed this *energy in color* for its functional painting system of COLOR DYNAMICS. By using it, you select colors more easily and accurately—to lessen eye strain, stimulate concentration, retard fatigue, increase comfort and cheerfulness. You add to the efficiency and productivity of workers and heighten their morale.

● **You can also use** COLOR DYNAMICS to create better working conditions in a variety of other ways. Offices can be made to appear longer or wider, higher or lower. You can paint sunlight into dark, dingy stairways or halls. You can give colors to lobbies and reception rooms that inspire confidence and build good will.

● **Here are two comments** typical of those expressed by many hundreds of executives who have used this modern, scientific method of painting.

● **Says T. T. Lloyd,** Vice-President of the Albion Malleable Iron Company, of Albion, Mich.: "After several years' experience with COLOR DYNAMICS we have found that the appearance of our offices and plant has influenced favorably our community and customer relations as well as our employee productivity and morale."

● **Writes W. H. Mohrhoff,** Superintendent of the Antibiotics Division of Parke, Davis & Company, of Detroit, Mich.: "Even our laboratory workers recognize they can do more and better work—with less physical fatigue—in areas that have been painted according to Pittsburgh's COLOR DYNAMICS system."

FREE—COLOR DYNAMICS Engineering Study of Your Offices or Plant!

● For a simple and complete explanation of the way in which your offices or plant can be made more efficient with COLOR DYNAMICS, send for our *free*, profusely illustrated book. It explains the principles of the *energy in color* and how to put this power to work for you—on the walls, ceilings, floors, machines—as well as mobile equipment.

● Better still, let us show you exactly how to apply COLOR DYNAMICS. We'll gladly submit a detailed color engineering study of your offices or plant—or any part of them—without cost or obligation. Call your nearest Pittsburgh Plate Glass branch and arrange to have our representative see you at your convenience. Or mail this coupon.

SEND FOR A COPY OF THIS BOOK

Pittsburgh Plate Glass Co., Paint Div., Department FM-53, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your Booklet *"Color Dynamics."*

☐ Please have your representative call for a Color Dynamics Survey without obligation on our part.

Name _____

Street _____

City _____ County _____ State _____

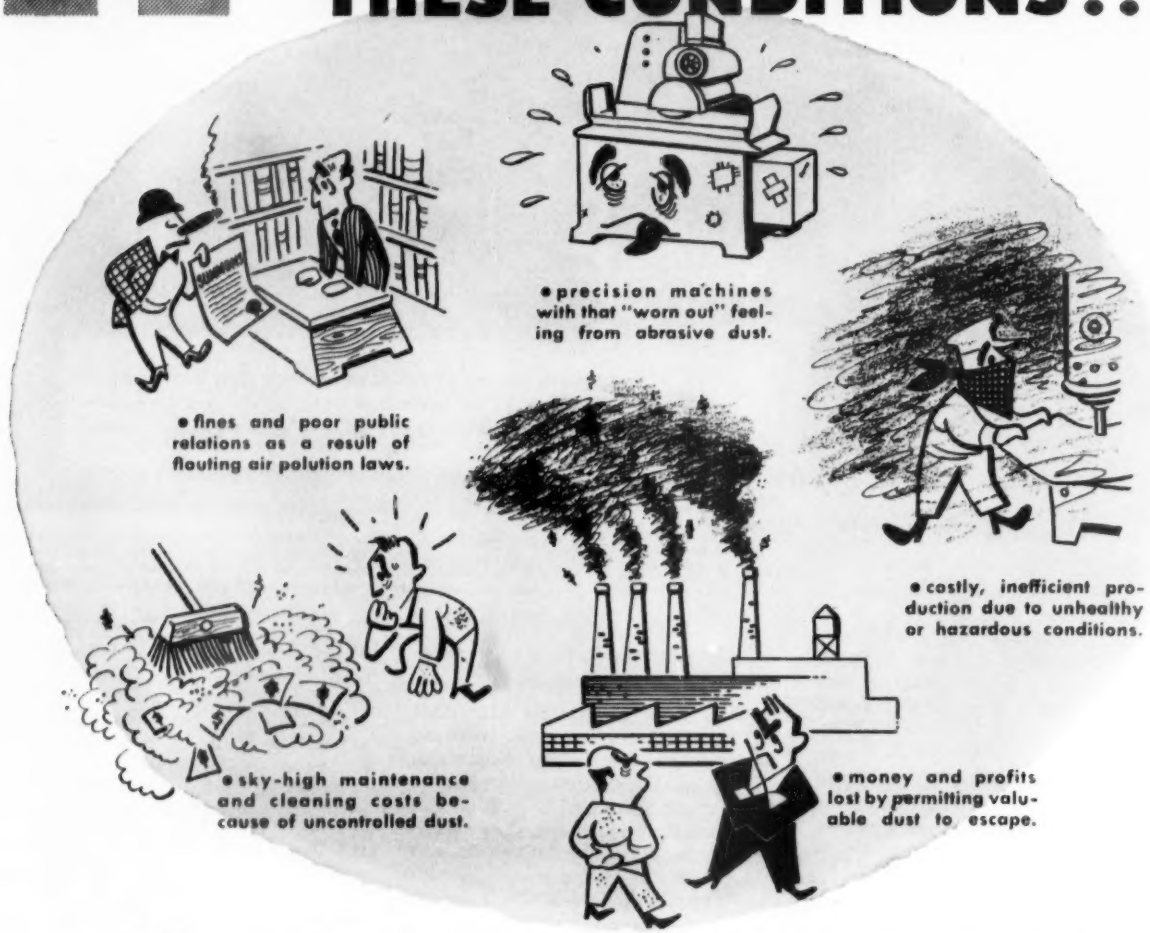
Copr. 1953, Pittsburgh Plate Glass Co. *Trade Mark Registered

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

IF YOU CAN "LAUGH-OFF" THESE CONDITIONS . . .


• precision machines with that "worn out" feeling from abrasive dust.
• fines and poor public relations as a result of flouting air polution laws.
• costly, inefficient production due to unhealthy or hazardous conditions.
• sky-high maintenance and cleaning costs because of uncontrolled dust.
• money and profits lost by permitting valuable dust to escape.

. . . if these conditions don't faze you—then you don't need dust control!

BUT—if your plant can't stand these costly inefficiencies—(and we're sure it can't)—then dust control is a *must*.

Dracco Dust Control Systems are industry's finest—because of Dracco's custom design and application engineering. For over 35 years, American industry has relied on Dracco to solve tough, unusual dust problems.

You can profit from our vast storehouse of practical dust control experience. Call or write today.

DRACCO CORPORATION
4075 East 116th Street • Cleveland 5, Ohio

DRACCO

Performance Proved

Airstream CONVEYORS • DUST CONTROL EQUIPMENT

OIL-FREE COMPRESSORS

VACUUM PUMPS and BOOSTERS

The battery of equipment illustrated is a typically efficient Joy installation. There's nothing new about oil-free compressors of course. Joy pioneered in their development, and has built them for more than 35 years.

Right above: Five JOY WNO-112 Oil-Free Compressors for pressure-testing of food containers, oil-free ejection of metal stampings, paint spraying and general oil-free processing service.

Left foreground: Three JOY WGV-9 Vacuum Pumps handle the job of vacuum feeding of metal sheets.

Left background: These three JOY WGB-9's boost gas pressure for the burners in the soldering process.

WBD 1-4016

giving highly satisfactory service in a large Midwestern Can Factory

For dependable *oil-free* air, day in and day out—as you may need it for any chemical processing or other special operation, or on that exacting instrument control job—there's a JOY OIL-FREE Compressor to meet your particular requirements. Dual Cushion valves, surface-hardened wearing areas and replaceable wearing parts are some of the exclusive JOY design features, and there's a complete line from 163 to 8800 CFM at pressures up to 100 PSI. A complete line of standard Compressors, Vacuum Pumps and Booster Compressors, too—and a line of Oxygen Generators of exclusive design. ● Write for Bulletin A-92, or . . .

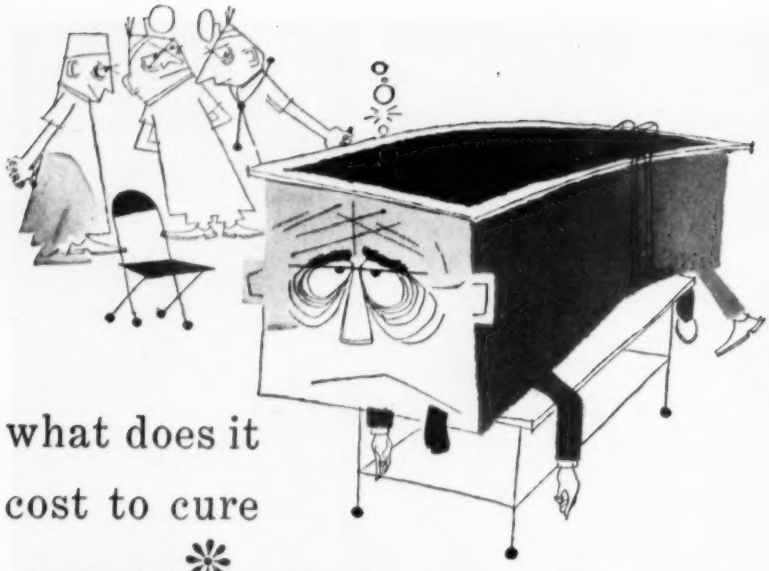
Consult a Joy Engineer

Over 100 Years of Engineering Leadership

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA), LIMITED, GALT, ONTARIO



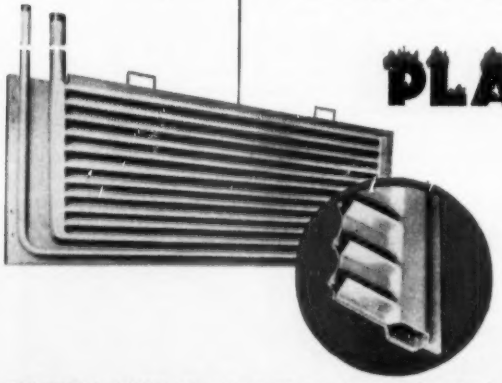
what does it
cost to cure
coil-itis in your processing tank?

The constant care it takes to keep tanks operating when they're plagued with coil-itis is extremely costly. Downtime, and all the other maintenance time, slow heating and cooling ills of using old-fashioned pipe coils can be cured with Platecoils. As revolutionary as the new wonder drugs, Platecoils save as much as 50% in initial cost. They take 50% less space in the tank. They simplify maintenance and save hours of downtime. Compared to the hours it takes to clean and replace pipe coils, Platecoils can be cleaned and replaced in no time at all . . . without dumping the solution. It costs less to cure coil-itis with Platecoils than to suffer its evils. **Write for bulletin P60 today!**

PLATECOILS SAVE 50% IN HEAT TRANSFER COSTS

PLATECOILS COST LESS TO BUY, INSTALL, MAINTAIN

The Newcomb-Detroit Co., Grand Rapids Division, has found it is less costly to buy, install and maintain Platecoils than to fabricate pipe coils in their own plant. Ask about other case histories.



PLATECOIL

REPLACES PIPE COILS

Coil-itis — Diagnosed as tank heating and cooling problems. **Platecoils** — the prescription for solving pipe coil problems.

PLATECOIL DIVISION, KOLD-HOLD MANUFACTURING CO., LANSING 4, MICHIGAN

Free NEW CATALOGS

Begins on page B-108

136 Steel Framing
Tells how you can use fully locking steel framing for a variety of plant uses. Describes three simple components. 4 pages. Ainsworth Mfg. Corp.

137 Spray Painting
This collection of catalogs on spray-painting equipment gives specifications and applications for each model. Spray guns, compressors, booths, accessories. More than 60 pages. The DeVilbiss Co.

138 Stud Driver
Where and how to use a gun-fired stud driver in this 6-pager. Describes studs, gun, cartridges. Industrial Sales Div., Remington Arms Co., Inc.

139 Cement
Here's a folder on a fast-setting cement that you can use to set anchor bolts or repair concrete floors. How-to-do-it data. The Hallemite Mfg. Co.

140 Pipe Tools
In this 28-page catalog there's a complete line of pipe tools. Sections on accessories, mechanical features, and applications. Beaver Pipe Tools.

141 Cutters
You get 26 pages on a line of cutters and insulated tools in this pair of catalogs. Selection and application data. Catalog Nos. 530, 577. H. K. Porter, Inc.

142 Emergency Lights
This folder tells how you can have instant automatic emergency light when regular power fails. Tells how maker's lights

To get these catalogs, circle number on reader's service postcard next to back cover, Part Two.

SPANG CW STEEL PIPE

contributes to PERFECTION for

Paper Manufacturers Company

Quality control is essential to Paper Manufacturers Company's production of its *Perfection* line of specialty papers. A leading paper converter, PMC produces a first quality line of paper rolls for teletype, adding and calculating machines, as well as a wide variety of gummed and heat seal papers.

Quality-consciousness naturally led to the specification of Spang CW Steel Pipe for PMC's up-to-date Philadelphia plant. There Spang CW carries the load . . . in heating, plumbing and air conditioning lines, plus special lines for processed steam, chilled water, compressed air, and high and low viscosity oils.

In the production of Spang CW Steel Pipe, too, *quality control* plays a key role. Close temperature limits, rigidly adhered to . . . the most modern production machines and control devices . . . strict inspection during every operation—all contribute to Spang CW's high standard of quality and reliability, make it easy to cut, thread and bend. Small wonder that Spang CW is consistently the first choice of quality conscious Owners, Architects and Engineers—and of smart contractors as well.

Let quality and reliability be *your* guide. Don't just ask for pipe . . . specify Spang CW at your distributor's.

Owner: **Paper Manufacturers Company, Philadelphia, Pa.**

General Contractor: **Joseph Ney Industrial Operations, Inc., Indianapolis, Indiana**

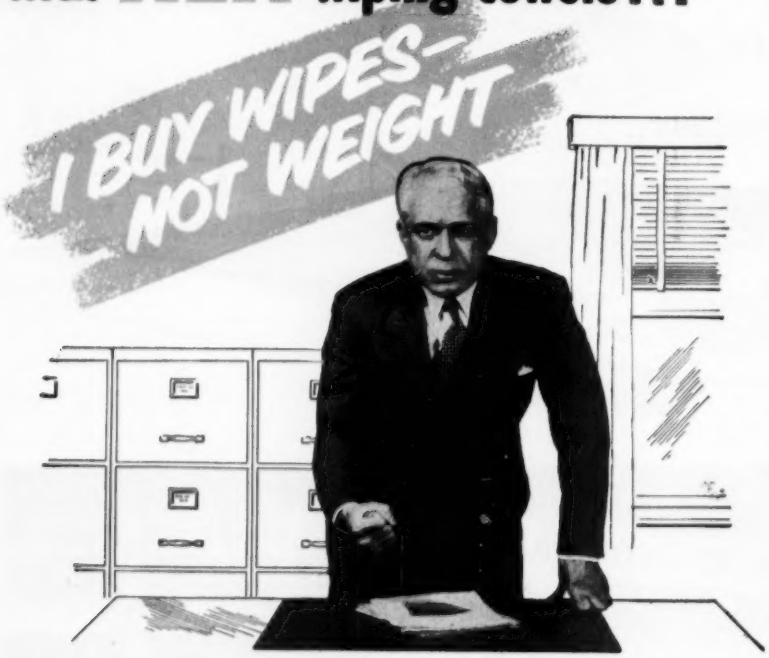
Piping Contractor: **Irwin H. English Company, Philadelphia, Pa.**

SPANG-CHALFANT

DIVISION OF THE NATIONAL SUPPLY COMPANY

General Sales Office: Pittsburgh 30, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis.

with KEX wiping towels...



Because Every Square Inch is Usable—and KEX Industrial Wiping Towel Rental Service...

- Is more economical
- Supplies towels that are safe to use
- Simplifies handling
- Saves man hours
- Better equips our men
- Relieves me of shopping around
- Is a national service I can depend on
- Is available to *all* my plants

For complete information see your Classified Telephone Directory for nearest Kex distributor, or write Kex National Service, 295 Fifth Avenue, New York 16, N. Y.

"KEX" NATIONAL SERVICE

REG. U.S. PAT. OFF.

It isn't Kex unless it's imprinted with the Kex name

Free NEW CATALOGS

Begins on page B-108

work, suggests places you can use them. Carpenter Mfg. Co.

143 Vibration Control
Describes spring, cork, and rubber vibration control units. Gives specs and advantages of each. Chart helps you select. 4 pages. Catalog No. G-105. The Korfund Co.

144 Masks, Goggles
This 48-page catalog illustrates and describes a line of head and eye protection equipment. Tells where to use each, gives specs and features. Catalog No. S-49. Dockson Corp.

145 Labels
Self-sticking industrial labels are subject of this file folderful of bulletins. Specs, and illustrations for the wire markers, pipe markers, safety signs, masks, and stencils. W. H. Brady Co.

146 Copper Tubes & Fittings
Complete manual for the selection and application of copper tubes and fittings in this 64-page catalog (No. C-24). Includes suggestions for assembling, gives useful charts. The American Brass Co.

147 Alloys
Corrosion-resistant alloys get the spotlight in this 20-pager. Property tables, sections on valves, pipe, and fittings made of the material. General Catalog No. 53. The Duriron Co., Inc.

148 Odor Control
Detergents, deodorants, and disinfectants described in this folder. Specs, applications. Form 7279R2. Oakite Products, Inc.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

Put WASTE HEAT to WORK!

Servel changes a dead loss into valuable PROCESS COOLING *and* AIR CONDITIONING

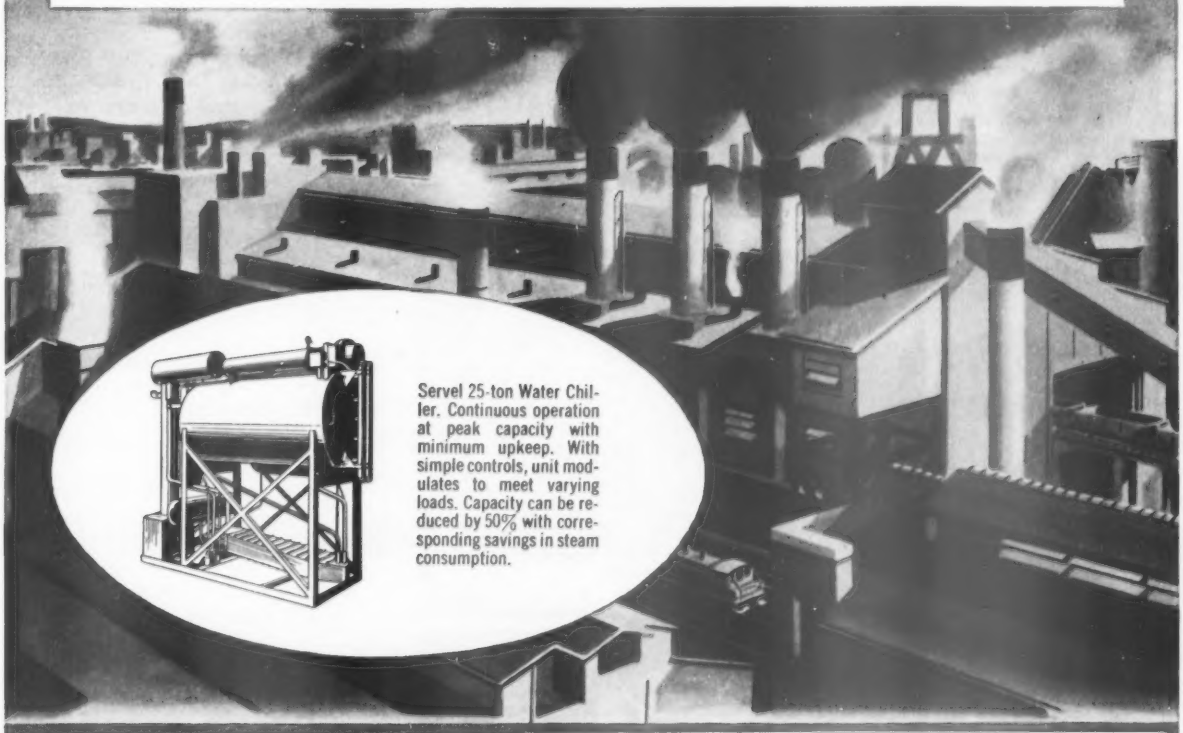
● If there's a need in your plant for air conditioning, process cooling, or industrial precooling, there's most certainly a place for a Servel Water Chiller.

These highly efficient units are powered by steam from any source. Many plants have found that *waste heat is readily turned to this use.*

Consider, too, the advantages beyond the availability and low cost of energy. Servel Water Chillers employ the time-proved absorption principle of refrigeration that *eliminates moving parts.* Water is used as the refrigerant. No compressors!

Compact size, quiet, vibration-free operation, and low floor loading make possible single or multiple installations in practically any location. Simple and economical piping arrangements are possible. In many air-conditioning installations for large buildings, duct systems can be eliminated entirely.

Servel Water Chillers are available in capacities for many types of *load. All carry a full 5-year warranty!* Contact your Servel dealer, or mail coupon for details and engineering help on your problems.



Servel 25-ton Water Chiller. Continuous operation at peak capacity with minimum upkeep. With simple controls, unit modulates to meet varying loads. Capacity can be reduced by 50% with corresponding savings in steam consumption.

Servel

the name to watch for great advances in

AIR CONDITIONING ✓ REFRIGERATION

SEND NOW FOR DETAILS!

SERVEL, INC., Dept. FM-5, Evansville 20, Indiana

Send me further details on Servel equipment for air conditioning, process cooling and industrial precooling.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

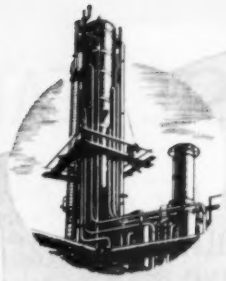
Laykold
ASPHALT SPECIALTIES

WEATHERCOAT
Slows Weathering

Weather and water can't affect the protective qualities of Weathercoat: this tough ductile asphaltic coating *bridges* expansion, but remains firm under heat or cold.

That's why Weathercoat is preferred by most of the world's largest refineries* for protection of exposed insulation on fractionating columns, crude stills and tanks...for sealing insulation joints...exposed insulated pipelines ...for membranes in reservoirs.

No fire hazard—apply it cold!
Brush, trowel or spray Weathercoat—it's easy —"palms" beautifully over uneven surfaces!
**Names on Request*



REFINERY TOWERS

INSULATED PIPELINES

AMERICAN
Bitumuls & Asphalt
COMPANY

200 BUSH ST., SAN FRANCISCO 4, CALIF.
Providence 14, R.I. Perth Amboy, N.J. Baltimore 3, Md. Mobile, Ala. Columbus 15, Ohio Tucson, Ariz. Seattle, Wash. St. Louis 17, Mo. Baton Rouge 2, La. Inglewood, Calif. Oakland 1, Calif. Portland 7, Ore. Washington 6, D.C. San Juan 23, P.R.

COOLERS for every plant need
The workers' productivity depends as much on comfort in the plant as on methods and machines. One big step forward is the installation of Halsey Taylor Coolers at strategic shop locations to insure a plentiful supply of cool water. The Halsey Taylor line is complete . . . coolers with vitreous china or stainless steel tops, cafeteria models, remote-type coolers . . . and of course, fountains for shop or office.
The Halsey W. Taylor Co., Warren, Ohio
MODERN
Halsey Taylor
COOLERS

Free NEW CATALOGS

Begins on page B-108

149 Pumps
You get the story on maker's centrifugal pumps in this 12-pager (No. 721-6). General information, specs, mechanical and performance data included. Goulds Pumps, Inc.

150 Pumps
"Studying the installation" is title of this useful collection of engineering data. All you need to know to install the right pump properly in this 8 pager. Viking Pump Co.

151 Pumps
Form No. 7223 covers maker's general-purpose centrifugal pumps. Selection chart, product illustrations and drawings, performance data. Section on special-purpose units. Ingersoll-Rand.

152 Pumps
Many types of pumps for applying protective coatings are shown in catalog No. 451. Cutaway drawings show how pumps work. Application data shows where to use them. Gray Co., Inc.

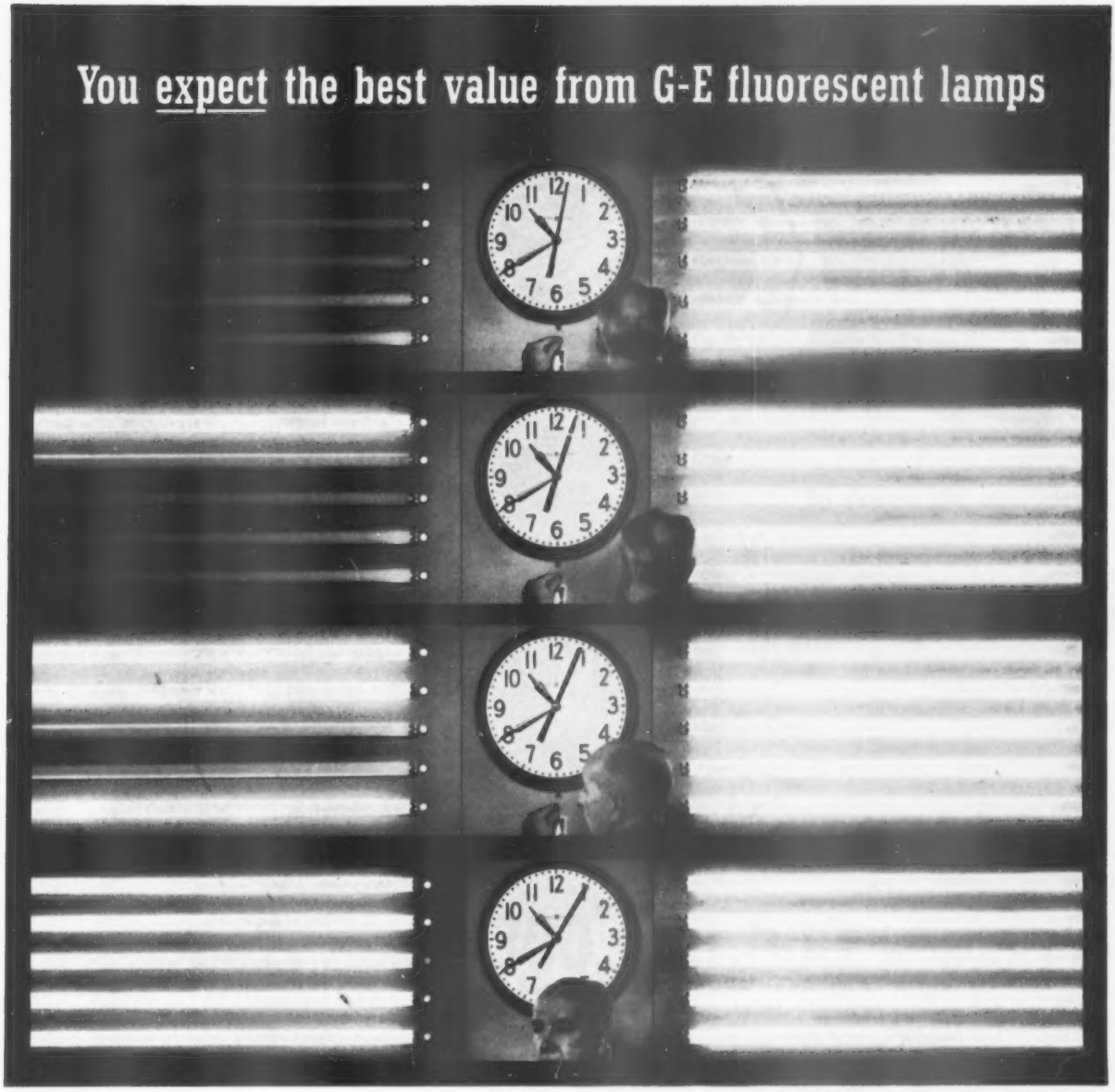
153 Pumps
Turbine-type and centrifugal pumps in this 12-pager. Specs, construction details, operating data for each model. Aurora Pumps Co.

154 Drain Filter
Data sheets on automatic drain filter for removal of liquids and solids from compressed air lines—combined with automatic drainage of collected fluids. Specs, features, illustrations. C. A. Norgren Co.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

You expect the best value from G-E fluorescent lamps



New G-E fluorescent lamp starts quicker, needs no starter

Watch the clock. Above are four unretouched photos taken about one second apart. On the left are regular fluorescent lamps, on the right the new General Electric *Rapid Start* fluorescent lamps. All were started at the same instant.

Within two seconds, all five G-E *Rapid Start* lamps are fully lighted. The regular lamps are only beginning to light.

Two new General Electric developments made the *Rapid Start* lamp possible: a triple coil cathode that holds more starting chemical and a *Rapid Start* ballast that pre-heats the lamp automatically. No starter needed. No wait for pre-heating. Starting is almost instantaneous, maintenance simpler, cheaper.

Rapid Start lamps and ballasts are now available. You *expect* the best value from G-E fluorescent lamps. Here's one more reason why you can.

For free folder, "Facts About Rapid Start" write General Electric, Dept. 166-FMM-5, Nela Park, Cleveland 12, Ohio.

You can put your confidence in —

GENERAL ELECTRIC

The stamp of approval which you have placed on Solar's line of original self-closing waste receptacles has been acquired through years of producing quality units.

In every conceivable type of location you will find Solar Self-Closing Waste Receptacles. With its exclusive gravity self-closing top, the Solar Receptacle has become a sanitation "must" in schools, hospitals, food processing plants, factories, municipalities and countless other institutions. It has no springs, weights or hinges to get out of order. The very simplicity of the Solar top is our assurance to you of satisfactory service.

Your premises will be neater, cleaner and safer with Solar Self-Closing Waste Receptacles. Write for additional information.

PSC

SOLAR-STURGES Mfg. Div.,
PRESSED STEEL CAR COMPANY, INC.
Melrose Park, Illinois • AUstin 7-1964

Free NEW CATALOGS

Begins on page B-108

155 Floor Machine
Here's a 12-page catalog on maker's floor machine. Parts illustrations, specifications, and applications. Catalog No. 53. Atlas Floor Surfacing Machinery Corp.

156 Diesel, Gas Engines
In this 12-page catalog you'll find applications, specs, and construction details on diesel, duafuel, and spark-fired gas types. Application photos. Nordberg Mfg. Co.

157 Scaffolds
You learn about a fully-adjustable scaffold — how it's constructed, where you can use it. Tells how you can adapt it to any plant need with a few simple adjustments. 16 pages. Baker-Roos, Inc.

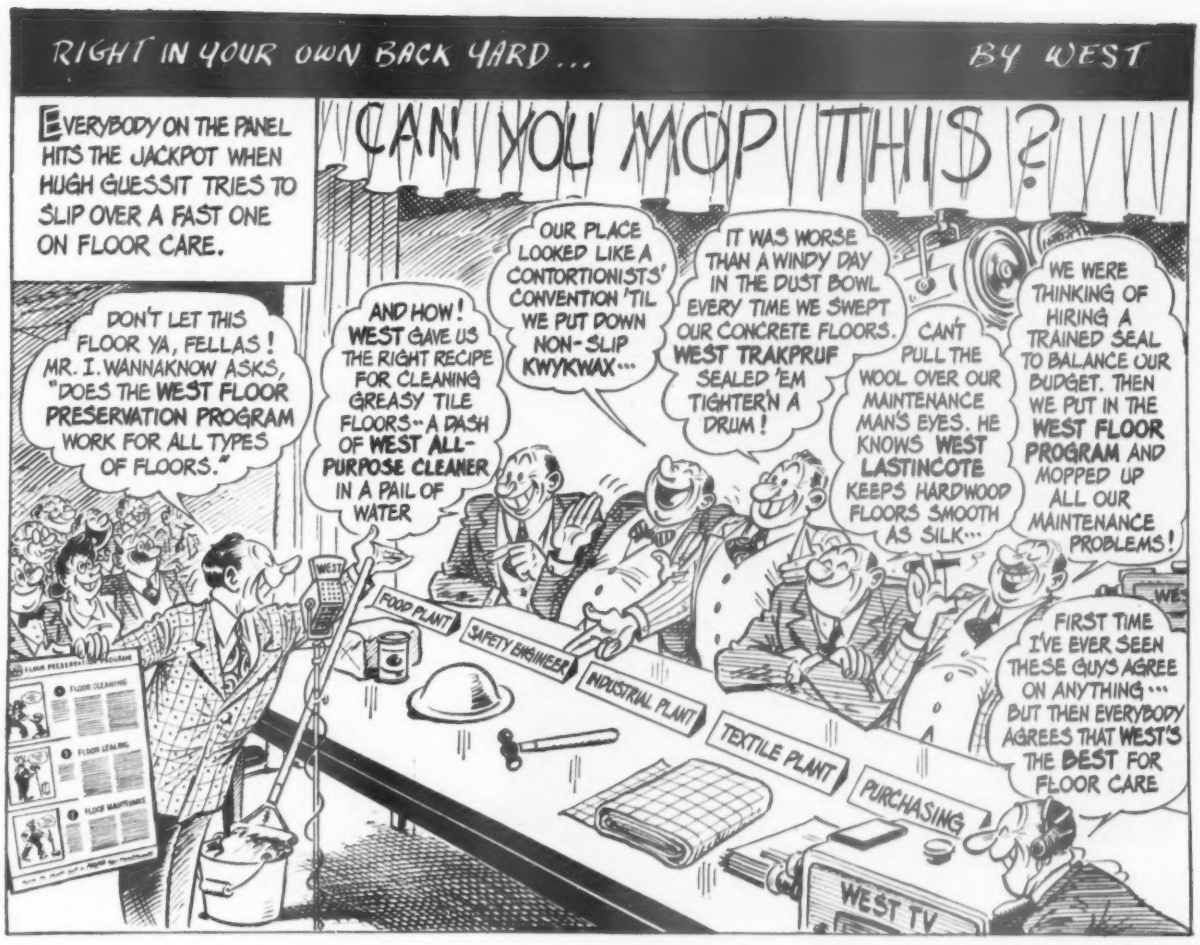
158 Brushes
Data sheets on maker's brushes in this group. Section on paint rollers. Specs, applications, prices, product illustrations. Rubberset Co.

159 Concrete Drill
Folders and data sheets on rotary concrete core drills. How they work and how to use them. Prices, too. Tilden Tool Mfg. Co.

160 Hand Tools
Many wrench and tool sets shown in this 8-page catalog. Illustrations, specs, and prices. Bonney Forge & Tool Works.

161 In-Plant Feeding
Gives advantages of in-plant feeding system, lists of features. Describes makers kitchen equipment, tells how to use it. Hotpoint, Inc.

To get these catalogs, circle number on reader's service postcard next to back cover.


RIGHT IN YOUR OWN BACK YARD... BY WEST
EVERYBODY ON THE PANEL HITS THE JACKPOT WHEN HUGH GUESSIT TRIES TO SLIP OVER A FAST ONE ON FLOOR CARE.
CAN YOU MOP THIS?
DON'T LET THIS FLOOR YA, FELLAS! MR. I. WANNAKNOW ASKS, "DOES THE WEST FLOOR PRESERVATION PROGRAM WORK FOR ALL TYPES OF FLOORS."
AND HOW! WEST GAVE US THE RIGHT RECIPE FOR CLEANING GREASY TILE FLOORS--A DASH OF WEST ALL-PURPOSE CLEANER IN A PAIL OF WATER
OUR PLACE LOOKED LIKE A CONTORTIONISTS' CONVENTION 'TIL WE PUT DOWN NON-SLIP KWYKWAX...
IT WAS WORSE THAN A WINDY DAY IN THE DUST BOWL EVERY TIME WE SWEPT OUR CONCRETE FLOORS. WEST TRAKPRUF SEALED 'EM TIGHTER'N A DRUM!
CAN'T PULL THE WOOL OVER OUR MAINTENANCE MAN'S EYES. HE KNOWS WEST LASTINCOTE KEEPS HARDWOOD FLOORS SMOOTH AS SILK...
WE WERE THINKING OF HIRING A TRAINED SEAL TO BALANCE OUR BUDGET. THEN WE PUT IN THE WEST FLOOR PROGRAM AND MOPPED UP ALL OUR MAINTENANCE PROBLEMS!
FIRST TIME I'VE EVER SEEN THESE GUYS AGREE ON ANYTHING... BUT THEN EVERYBODY AGREES THAT WEST'S THE BEST FOR FLOOR CARE
FOOD PLANT
SAFETY ENGINEER
INDUSTRIAL PLANT
TEXTILE PLANT
PURCHASING
WEST TV

New floors cost $300,000,000 *a year!*

TYPE OF FLOOR	INSTALLED COST* OF 50,000 SQ. FT.
Asphalt Tile	$15,000
Concrete	18,000
Linoleum	21,000
Hardwood	27,500
Cork	39,000
Rubber Tile	44,000
Vinyl Tile	44,000
Ceramic Tile	65,000
Terrazzo & Mosaic	87,500
Marble	150,000

*Based on reports of reliable flooring contractors in urban areas.

How much will it cost you to replace worn-out floors today? The chart gives you some idea.

But, your floors *don't have* to wear out. They can be protected almost indefinitely.

How? With West's simple, proven FLOOR PRESERVATION PLAN. (1) *Cleaning* — remove all dirt without harming floors (2) *Sealing* — fill the pores. Provide a protective coating (3) *Maintaining* — put on a tough, anti-slip floor wax.

The West Plan offers you more than 20 proven products. A West Floor Specialist will be glad to help you select the program or product you need.

WEST DISINFECTING Company

42-16 West Street, Long Island City 1, N. Y.

Please send FREE booklet "Proper Care of Floors"

DEPT. 56

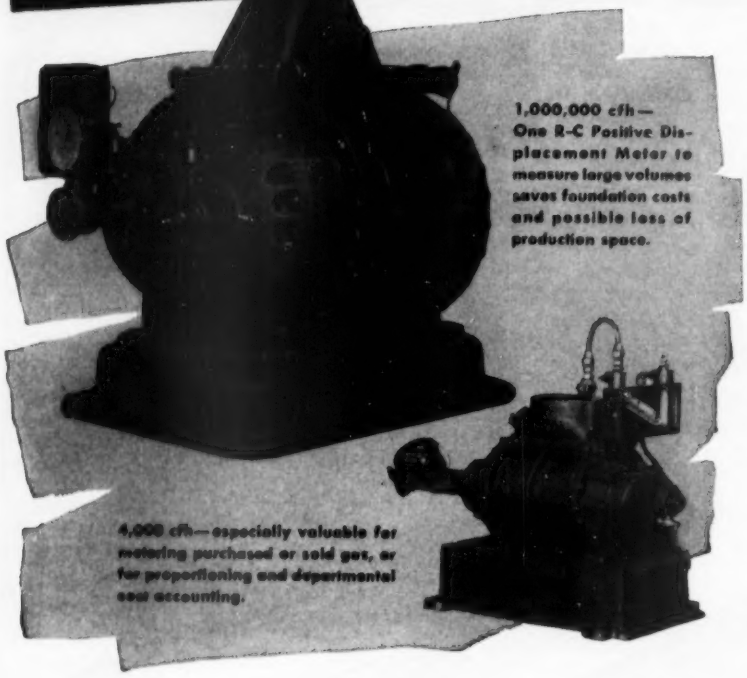
Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

CALL ON THE "Specialists" FOR ACCURATE METERING


1,000,000 cfh—
One R-C Positive Displacement Meter to measure large volumes saves foundation costs and possible loss of production space.
4,000 cfh—especially valuable for metering purchased or sold gas, or for proportioning and departmental cost accounting.

The successful performance of Roots-Connersville Positive Displacement Meters has long been proved by large and small industrial plants and public utilities. These users rate them high in such basic essentials as:

Accuracy—not affected by pressure, wide ranges in loads or other variables. Absence of valves, vanes and other small parts insures "cash register" accuracy over years of use.

Capacity—from 4,000 cfh to 1,000,000 cfh in one unit, with ample ability to absorb overloads.

Compactness—smallest made for industrial use in foot-for-foot of capacity. Can be located in otherwise unusable space, thus saving production areas.

Almost a century of experience in handling gas and air, exclusively, goes into the design and construction of R-C Meters. They're part of the comprehensive line of blowers, exhausters, gas and vacuum pumps and related equipment, which are the products of R-C Specialists, and which are in widest use in industry.

A new bulletin, M-152, gives complete data on R-C Meters, including a handy selection table which simplifies your choice of the right meter to suit your specific application. Your copy will be sent on request.

ROOTS-CONNERSVILLE
Exclusive Specialists in Handling Gas and Air

ROOTS-CONNERSVILLE BLOWER A DIVISION OF DRESSER INDUSTRIES, INC. 533 Central Ave. • Connersville, Indiana

FILM PROGRAM OF THE MONTH

PLANT SERVICES

Other film programs will be found on the following pages:

BUILDINGS & GROUNDS page B-56
ELECTRICAL DISTRIBUTION B-276
MATERIALS HANDLING B-344

"COMPRESSED AIR IN ACTION" describes the use of compressed air in various industries, illustrates uses for a number of compressors. Silent slidefilm. Available from:

Compressed Air & Gas Institute, 1404 Terminal Tower, Cleveland 13.

"EXHAUST HOODS: THEIR DESIGN AND APPLICATION" presents the theories and applications of hooding operations involving fumes and gases. Includes complete enclosures, modified enclosures, large remote, small remote, and side hoods. 19 minutes, color. Write:

American Air Filter Co., Inc., Lousiville 8, Ky.

"A CASE FOR COLOR" illustrates the psychological implications of color and promotes color conditioning. 23 minutes, color: Write:

E. I. du Pont de Nemours & Co., Inc., Motion Picture Distribution, Wilmington 98, Del.

"INDUSTRIAL LIGHTING" discusses the design of interior industrial lighting in typical low-bay and high-bay areas. Compares old and new lighting. 15—mm. sound-slidefilm. Write:

Westinghouse Electric Corp., Box 868, 511 Wood St., Pittsburgh 30, Pa.

"GROUP REPLACEMENT OF FLUORESCENT LAMPS" shows how you can junk your fluorescent lamps at 80% of life and save $120 per 1000 lamps. Other benefits, too. Runs 20 minutes. Write:

Advertising & Sales Promotion Dept., Westinghouse Electric Corp., Bloomfield, N. J.

NEW! NEW!

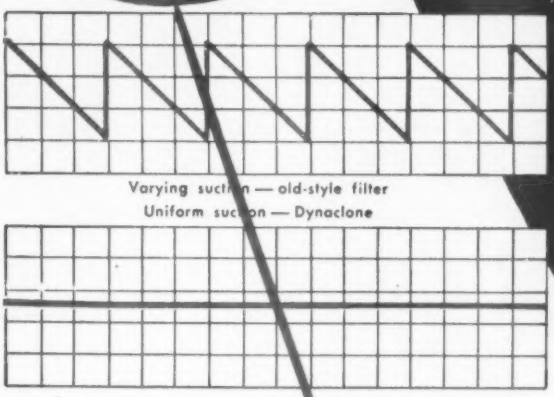
NEW Cloth Screen Dust Filter

SLY DYNACLONE*

You saw this ad 3 years ago

offers 5 NEW ADVANTAGES!

1. Eliminates mechanical shaking.
2. Provides uniform suction at dust source.
3. Assures longer bag life . . . 4. minimum maintenance.
5. Keeps itself automatically and continuously clean without additional power or equipment.



Varying suction — old-style filter

Uniform suction — Dynaclone

Send for descriptive bulletin just out on the new Sly Dynaclone — the ultimate in filter performance.

* REGISTERED TRADE-MARK

This revolutionary new dust filter is another Sly first. Extremely simple and thoroughly dependable, it eliminates entirely the gremlin of mechanical shaking and provides uniform suction of air at dust source.

This uniform suction is achieved by a simple device which cleans the filter bags successively by a reverse flow of air—the same suction which draws the dust onto the filter cloth is reversed to blow it off.

Since this reverse air suction operates continually, the new Sly Filter requires no shutdowns for removing dust from the cloth.

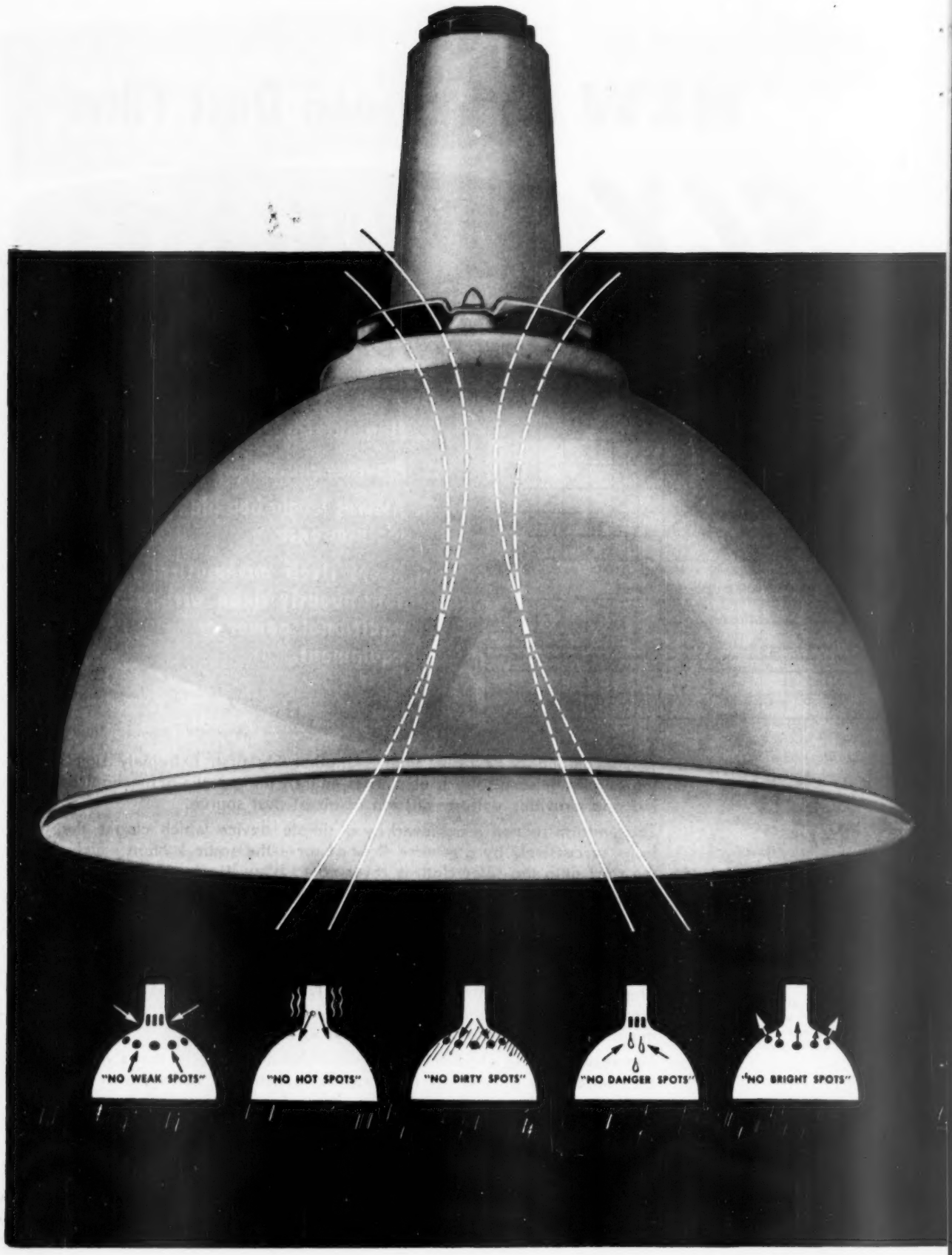
No mechanical shaking or flexing device is needed, eliminating all strain and wear.

The [illegible] ry equipment [illegible] d a very minimu

The result of long experimentation and exhaustive tests, the Sly Dynaclone has thoroughly proved itself. It provides substantial savings over any other type of cloth screen dust collection. Write for complete information.

SLY PIONEERS and LEADERS in INDUSTRIAL DUST CONTROL

THE W. W. SLY MANUFACTURING CO.
4755 Train Avenue • Cleveland 2, Ohio
NEW YORK • CHICAGO • PHILADELPHIA • SYRACUSE
DETROIT • BUFFALO • CINCINNATI • ST. LOUIS
INDIANAPOLIS • BIRMINGHAM • LOS ANGELES • TORONTO


"NO WEAK SPOTS"
"NO HOT SPOTS"
"NO DIRTY SPOTS"
"NO DANGER SPOTS"
"NO BRIGHT SPOTS"

3 times more light with only 10% increase in kilowatt hours

. . . the combination of mercury lighting plus ventilated high-bay luminaires makes this possible

The Worthington Corporation's Oil City, Pa. plant jumped its illumination from a measured 5-10 footcandles to 25-30 . . . and by using Westinghouse ventilated, high-bay units, maintained this better light longer, and at the same time, cut fixture cleaning costs.

This lighting improvement is only part of an electrical expansion program, *to modernize with light-for-better-work.* 1000-watt incandescent units were replaced by new Westinghouse 1000-watt mercury units. Original branch wiring and conduit from the 230-volt power supply were re-used by employing a 220-volt single-phase a-c power system. Power consumption increased only 10%, but Worthington workers enjoy *three times more light.*

These construction features make sense

In Westinghouse high-bay luminaires, the opening between the neck and the reflector provides a constant air stream which sweeps clean the entire reflecting surface. There is less manual cleaning needed—lighting efficiency is maintained longer. With fixtures at 48 feet above floor level, this is wholly practical and economical! And Worthington gets these additional features in the Westinghouse high-bay luminaire; longer lasting because reflector and extension neck are two separately spun pieces —*no thin spots. No weak spots* to cause trouble because the ventilating system is neither a part of the extension nor reflector. *No spotty dirtiness* because the ventilator is one large opening.

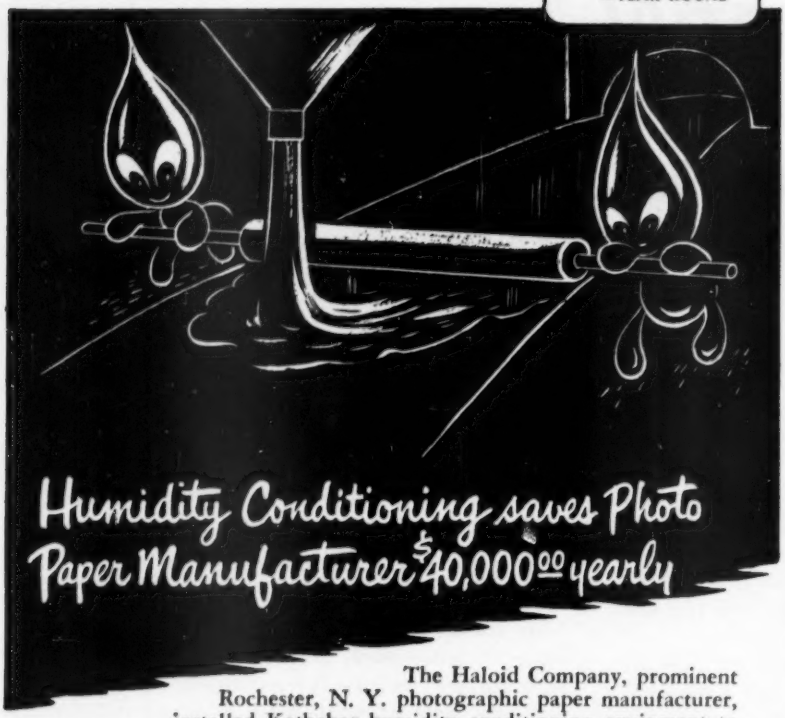
You, too, can modernize with light for better work

This is only one example of what can be done with *light-for-better-work.* If your problem is high-bay lighting, we can solve it—and other industrial lighting problems as well—with a variety of specially designed luminaires and Westinghouse engineering experience. Why not see your Westinghouse distributor today and get the complete story? Write for B-5664, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-04338

YOU CAN BE SURE...IF IT'S Westinghouse

Kathabar

MAINTAINS IDEAL PRODUCTION WEATHER IN YOUR PLANT—EVERY DAY —YEAR ROUND



Humidity Conditioning saves Photo Paper Manufacturer $40,000.00 yearly

The Haloid Company, prominent Rochester, N. Y. photographic paper manufacturer, installed Kathabar humidity conditioning equipment to supply dry air for *continuous* tunnel drying of emulsion-coated photographic paper. Kathabar replaced conventional air conditioning equipment and *saves Haloid $40,000 annually.*

In addition to improving Haloid's product quality, the Kathabar equipment paid for itself in the first year. Kathabar is providing substantial savings for manufacturers of chemicals, textiles, goods, pharmaceuticals, shoes, plastics, glass, and a wide range of other products.

LET US SEND YOU informative case histories as well as "The Humidity Engineer." These studies will tell you what Kathabar has accomplished for others. They may give *you* an idea how to profit from Kathabar's use.

SURFACE COMBUSTION *Corporation*

TOLEDO 1, OHIO

Kathabar HUMIDITY CONDITIONING SYSTEMS

'Surface' INDUSTRIAL FURNACES AND BURNERS

Janitrol AUTOMATIC HEATING EQUIPMENT

CE-7

☐ Send me case histories and complete information on Kathabar humidity conditioning equipment.

☐ Send me information on .....
(Write here any special humidity problem you may have)

NAME .....

COMPANY .....

ADDRESS .....

CITY .....ZONE.....STATE.....

SAVE

Maintenance & Towel Costs WITH

Sani-Dri ELECTRIC HAND OR HAIR DRYERS

SAVES MAINTENANCE EXPENSES!
New No. 8 wall model with patented, faster-drying features!
ELIMINATES TOWEL EXPENSE . . . SAVES STORAGE SPACE
ELIMINATES TOWEL LITTER

Save valuable maintenance time and eliminate continuing towel expense. New high-speed Sani-Dri provides quick, automatic hand or hair drying service 24 hours a day year after year! Sani-Dri is a permanent solution to your washroom sanitation and drying problem . . . and SAVES UP TO 85% OF YOUR WASHROOM COSTS!

INDUSTRY TURNS TO AUTOMATIC DRYING!

Budget-wise corporations, in ever increasing numbers, are saving thousands of dollars yearly by changing to Sani-Dri Electric Dryers. Get the facts on new faster drying machines NOW!

TABLES WITH SWING SEATS

For Plant Lunchrooms

Maximum seating capacity of 4 to 24 people in minimum space. Seats swing completely under table . . . more aisle space . . . less noise and confusion. Cast construction. Choice of tops in Formica, maple, stainless steel. Easy maintenance.

WRITE TODAY for new brochure on Sani-Dri Electric Dryers and complete illustrated catalog on Tables.

Distributors in Principal Cities

THE CHICAGO HARDWARE FOUNDRY CO.

"Dependable Since 1897"

1153 Commonwealth Ave. • North Chicago, Ill.

a good "family" to know for

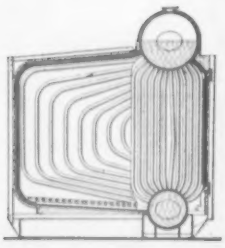
LOW-COST STEAM

B&W Integral-Furnace Boilers

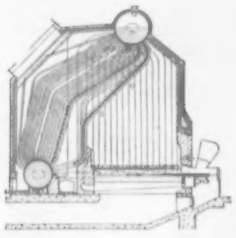
For Steam Requirements From 2900 to 350,000 Lb/Hr

Long established as the leading choice of industrial and other users for an ever-growing variety of applications, B&W Integral-Furnace Boilers of every type and rating, and covering an unusual range of steam requirements, are *service-proved . . . your proof* of lower steam costs combined with higher service life. Total capacity of B&W "F" Boilers—in service and on order—is well over 200,000,000 lb per hr. This sweeping acceptance by users is your strongest possible assurance of B&W reliability and economy.

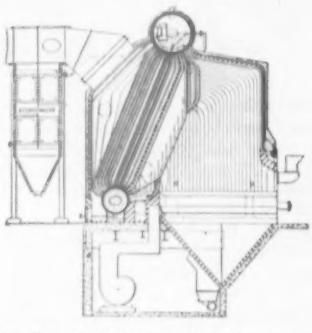
Before planning your next installation, check with B&W for the Integral-Furnace Boiler best suited to your needs. These units are available for all standard fuels, and B&W can also meet your requirements should conditions demand the use of special fuels. Write for illustrated bulletins covering the B&W "F" Boilers in greater detail. The Babcock & Wilcox Company, Boiler Division, 161 E. 42nd Street, New York 17, N. Y.



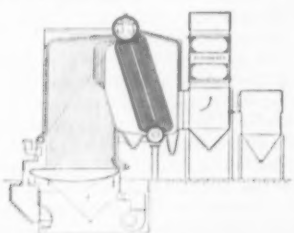
TYPE FM—2,900-28,000 lb/hr up to 250 psi. Oil and Gas Firing.



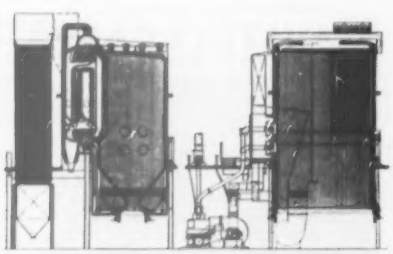
TYPE FF—8,000-50,000 lb/hr up to 600 psi. Stoker, Oil and Gas Firing.



TYPE FJ –30,000-70,000 lb/hr up to 800 psi. Stoker, Oil and Gas.



TYPE FL—60,000-150,000 lb/hr up to 1050 psi. Stoker, Oil and Gas Firing.



TYPE FH—50,000-350,000 lb/hr up to 1050 psi. Pulverized Coal, Oil and Gas Firing.

COST SAVING FEATURES

- Minimum floor space and headroom requirements.
- High fuel economy.
- Smokeless combustion.
- Adaptable to all fuels and firing methods.
- Economical fast steaming.
- Water-cooled furnace.
- Clean, dry steam at all ratings even with high boiler water concentrations.
- Quick response to wide and heavy load swing demands.
- Easy to inspect and clean.
- High availability with least attention.

BABCOCK & WILCOX

G-601

with THE MULTI-CLEAN METHOD!"

"Keeping our floors sealed with Multi-Clean Concrete Preserver holds dust to a minimum throughout the plant and makes them easier to keep clean and sanitary," says the floor maintenance director of Griggs, Cooper and Company, large mid-western food processing firm.

"Daily sweeping time has been cut at least one-third because heavier dirt doesn't stick to the hard, smooth finish, and dust sweeps up easily. Moisture, too, is prevented from penetrating the floor surface, and makes it impervious to alkalies, grease, acids, etc.

"In our spice and baking powder rooms, dust is extremely fine and hard to sweep up. Here we use the Multi-Clean industrial vacuum which gives us an efficient and dust-free operation.

"We wet mop all our concrete floors once or twice a week and buff them once a month with a fine steel wool disc under a Multi-Clean floor machine to loosen any stubborn dirt and restore the finish. Multi-Clean Concrete Preserver is applied every 6 months to a year, depending on traffic conditions.

"With the Multi-Clean Method of floor care, our concrete floors are kept in better condition to stand the rigorous traffic they get every day. Then, too, they're always clean and attractive, and repairs and replacements are practically non-existent."

Multi-Clean Concrete Preserver

Multi-Clean Floor Machine

Multi-Clean Wet-Dry Vacuum

Every Multi-Clean product carries a 100% guarantee.

MULTI-CLEAN®
PRODUCTS INC

free! FLOOR MANUALS
Each for the proper care of a specific floor. Check the coupon for the manuals of your choice.

MULTI-CLEAN PRODUCTS, INC.
2277 Ford Parkway • Dept. FM-5, St. Paul 1, Minn.
Gentlemen—I would like to know more about the Multi-Clean Method for my floors. Send manuals I have checked.

☐ Asphalt Tile ☐ Concrete ☐ Rubber Tile
☐ Wood ☐ Terrazzo ☐ Linoleum
☐ 9-Job Floor Machine ☐ Wet-Dry Vacuum
☐ All-Purpose Scrubber

Name and Title
Company
Address
City Zone State

Field Reports

Here is just a taste of the mass of "raw material" from which FACTORY editors prepared the "trends" articles on pages B-2, B-78, B-198, B-278.

We found these field reports packed so full of information and such good reading that we thought FACTORY readers would like to read them, too. We're reproducing three of them here (no editing—this is the way we got them) and two more beginning on page B-352.

Field Report No. 1

On Rand McNally & Company's new Skokie (Ill.) plant. By Western Editor Walt Wagner.

PLANT IS ONE-STORY, with the exception of the L-shaped office area, which is two-story. Total area—about 230,000 square feet. About 700 employees. Located in suburban Skokie—move made to get away from the congestion and high rents of downtown Chicago. Cost $2,250,000—less than $10 per square foot. Contractor tells me that, exclusive of the cost of the air-conditioning set-up, price was under $7.

Low cost was not the result of unusually favorable conditions. On the contrary, they had a tough sub-soil condition — a hard clay layer over a soupy material. Building had to rest on the hard layer. The concentrated load of the water tower rests on piles.

Plant is designed for expansion in two directions. And these two sides have curtain walls—cinder block and steel sash. Structural members along these walls are oversize to support expansion without beefing up. Plant is laid out in such a way that expansion will be along the side of the plant now used for warehousing—will not disturb the presses or heavy lithoplating equipment.

Reinforced concrete foundation and floor slab, hardened to hold

Send for your *free* copy

PURCHASING AGENT

60 PAGES

OF APPLICATION *for* AND SELECTION AIDS

AIR HANDLING

AIR CONDITIONING

AIR CLEANING

PLANT ENGINEER

PRODUCTION MANAGER

Here, for consultants and engineers as well as any plant executive with an interest in the selection and application of equipment, is a brand-new, 60-page catalog. It covers the entire line of air handling, air conditioning and electronic air cleaning products. It gives hundreds of applications throughout industry. Its reference data section provides handy tables and formulas for figuring your requirements and applying the equipment.

Over one hundred illustrations show the products and typical uses. Condensed capacities and dimensions simplify their selection. A Quick-Finder Chart shows you at a glance which products best fit the application, and a Quick-Finder Index with colored tab guides refers you to those products, quickly.

Copies are ready for immediate mailing. You can get yours by filling in the coupon below and attaching it to your business letterhead. If this catalog would be useful to others in your organization, list their names and titles, too. They will also be sent copies.

YOU CAN BE SURE...IF IT'S

Westinghouse

J-80263

AIR HANDLING • AIR CONDITIONING

WESTINGHOUSE ELECTRIC CORP.
Sturtevant Division
184 Damon Street
Hyde Park, Boston 36, Mass.

Please send me a copy of Catalog 600.

NAME_____

TITLE_____

FIRM_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

HERE'S THE EXTINGUISHER YOU PICKED AS "EASIEST TO USE" OVER THREE OTHER LEADING BRANDS...

Randolph

Safety and Plant Engineers—here's how you voted: In a national survey recently completed, 100% of your replies stressed *ease of operation* as a major factor in Extinguisher selection. And on the basis of being "easiest to use", 86% of your replies specified Randolph over the nearest brand—66% specified Randolph over *three* other leading brands, *combined!*

With no nozzles to adjust, no valves to turn, Randolph Extinguishers are 100% panic-proof. Just snap from the bracket, aim and press the trigger. You KNOW how to use this extinguisher *just by looking at it!*

COMPLETE LINE OF EXTINGUISHERS AND AUTOMATIC EXTINGUISHING SYSTEMS

Make sure your plant is mobilized for fire . . . with easy to use, simplified RANDOLPH Equipment. Sizes from 2½ to 50 lbs. Manual and automatic systems. Write Randolph Laboratories, Inc., 4 E. Kinzie St., Chicago 11, Illinois.

Begins on page B-144

down dust. There's a pit underneath each of the presses, so that the complex underside of the press is readily accessible to the operator for adjustment, the maintenance men for inspection and repair. There are ten presses in the press room now, with space for three more. Pits for these future presses were put in during original construction (they'd be very expensive to build after construction was complete), are covered by removable concrete panels.

Roof is conventional—structural steel and bar joists, metal deck, glassfiber insulation, built-up tar and gravel. However, the cantilever principle was used for the main trusses, resulting in a saving of 35% in amount of steel used over conventional truss construction.

Plant has partial air conditioning. Office is comfort conditioned —50% humidity, temperature between 70 and 80 degrees depending on outside temperature. Press room, cartographic room, lithoplating room, and bindery are process conditioned—50% humidity, 75 degrees. Air conditioning load is 500 tons—very high for a factory installation, the architect says. A roof-spray system cuts down the load on the air conditioning equipment during warm months. Rest of shop is heated or ventilated through direct-fired unit heaters.

Electrical distribution system is typical—bus duct running along column lines — but unusually heavy. Load in the press room, for example, is 450 horsepower. There is enough extra capacity for any foreseeable expansion.

Random Notes

Plot has been landscaped and trees planted. Side of plant facing street (and homes, across a vacant lot) is face brick, and is quite handsome.

Cafeteria seats 200, serves 500 noonday meals. Unusually attrac-

Day-Brite "Close-up" Quality

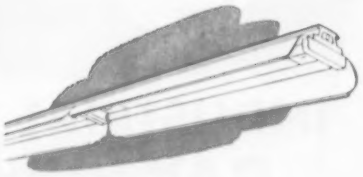
GIVES YOU EXTRA VALUE

for your plant lighting investment

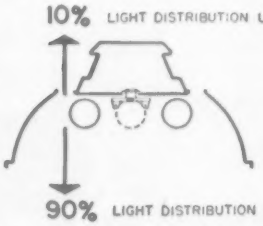
THIS IS A CLOSE-UP of the aperture in the reflector of a CFI DAY-LINE® industrial lighting fixture. These apertures are *die-embossed*. It would have been easier and quicker merely to stamp them out of the metal. But that would weaken the reflector—take away needed strength. Die-embossing retains strength and improves appearance.

DIE-EMBOSSED APERTURES are Day-Brite's way of giving you up-lighting without sacrificing ruggedness—one of many "close-up" quality features that mean extra value to you.

"CFI" means COMFORT FOR INDUSTRY



The CFI DAY-LINE® was designed to make plant lighting comfortable. The more energy a man has to use in seeing, the less he has left to do his work. And if he's bothered by shadows and harsh brightness contrasts, he not only produces less—he's a prime prospect for costly "on-the-job" accidents, too.



The diagram above shows the principle used by the CFI DAY-LINE® to give you more comfortable plant lighting. 10% of the light is directed upward through scientifically placed, die-embossed apertures in the reflector. 90% of the light goes directly down to the work area.

This direct-indirect distribution of light puts an end to dark ceilings and greatly reduces eye-disturbing brightness contrasts.

This greater comfort, plus the many Day-Brite "close-up" quality features —such as vibration-proof Turret* sockets on all units, all-white porcelain enameled reflectors, rust-inhibited parts, wiped reflector edges to eliminate chipping and crazing of the finish — make the CFI DAY-LINE the best industrial lighting value on the market today.

Write for full information. Ask for Bulletin OD-568. Day-Brite Lighting Inc., 5445 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

*® G. E. Co.

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

DAY SINCE 1881
DUST CONTROL
A SINGLE UNIT OR A COMPLETE SYSTEM

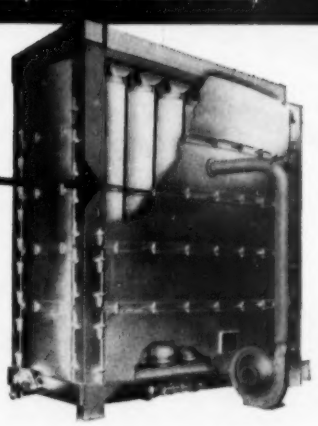
INDUSTRIAL PLANTS FIND DAY HIGH PRESSURE REVERSE AIR JET CLEANING ACTION

MORE ECONOMICAL MORE EFFICIENT

Automatic, continuous cleaning of the entire filter tube is the most important improvement in cloth dust filtering in half a century. **DAY's** advanced method of cleaning the filter cloth gives you filtering efficiencies up to 99.99+%.

DAY's reverse air jet mechanism provides uniform cleaning over the entire length of the tubes.

Reverse Air Jet Ring Travels Continuously Up and Down The Entire Filter Tube. High Pressure Reverse Air Blown Through The Filter Felt Keeps Filter Tubes Clean Constantly.



99.99+% Filtering Efficiency Provides Important Savings In Reclaiming Valuable Products

DAY's improved cleaning action permits the use of a better grade wool filtering fabric which gives filtering efficiencies up to 99.99+%. This better filter cloth also allows higher air-to-cloth ratios with uniform back pressure. Plant space is saved because less filter is needed to handle equal volumes of air, and one **DAY** "AC" Dust Filter can handle four different product streams simultaneously, without mixing. It will pay you to investigate the **DAY** "AC" Dust Filter for your dust control program.

LICENSED BY M. J. HERSEY, JR.

The **DAY** *Company*

858-3rd Ave. N. E., Minneapolis 13, Minn.
IN CANADA: P. O. Box 70R, Ft. William, Ont.
Branch Plants: Buffalo, Ft. Worth, Welland, Ont.

Send Coupon Now for Free Booklet on Dust Control with Comparison Charts.

GENTLEMEN: *Please send Dust Control Bulletin 528 of facts, figures and charts.*

Name_____

Company_____ Title_____

Address_____

Begins on page B-144

tive, with colorful mural on one wall. Has folding wall which can be drawn across cooking and counter area to transform cafeteria into a meeting room.

Steel sash has translucent glass to cut down glare and outside distractions. However, clear panes have been installed at regular intervals to give employees a look at outside weather conditions and plant grounds.

Although plant does not have (or need at present) a railroad siding, the plot was laid out to allow for a track in the future. Company has an understanding with the railroad that will get them a siding when, and if, desired.

Interesting sidelight: Company conducted a contest for a mural for the lobby. Four artists submitted rough sketches of their proposals, together with a small detailed section—showing the kind of finished work they do. Each of the proposals was paid for. The contest winner, of course, was commissioned to do the large mural, just completed.

Report No. 2

Interview with Edward X. Tuttle, Vice President, Giffels & Vallet, Inc., L. Rossetti, Associated Engineers and Architects, Detroit. By Midwestern Editor Bob Dilley

1. **The financial interests in manufacturing industries** do not give enough thought to ultimate low-cost maintenance and provision for expansion. The idea of first cost is too strong.
2. **Industrial plants need to be written off sooner.** Methods of manufacture change radically in a generation or less. And it's strictly uneconomical to keep many old facilities. Competition gets tougher as a company hangs on to an old plant.
3. **Flexibility for changes is needed.** Longer spans. Heavi-

Your Double Assurance of
LOW COST, LONG-LIFE ROOF PROTECTION!

Look for this Warranty and this Label When You Buy Asphalt-Aluminum Roof Paint or Coating

The *Liquid Aluminum* label and the special Warranty Seal give you double assurance of economical, lasting, one-coat protection for your rustable metal or built-up roofs. They are marks of a quality product that assure the minimum amount of aluminum pigment in an approved vehicle, processed by a reputable manufacturer.

When Asphalt-Aluminum Roof Paint or Coating is properly applied with either brush or spray, aluminum flakes rise to the surface and "leaf" on the drying asphalt to form a firm metallic shield. This aluminum coat reflects the sun's heat rays to keep buildings cooler in summer—increase employee morale and efficiency. It also adds years to roof life by retarding decomposition of the asphalt.

Remember, you are doubly assured when you choose an Asphalt-Aluminum Roof Paint or Coating with the *Liquid Aluminum* label or the special Warranty Seal. It is made by many leading paint manufacturers and is available through your regular paint supplier. Or write for names of manufacturers to the Reynolds Metals Company, 2518 South Third Street, Louisville 1, Kentucky.

Specify All-Purpose *Liquid Aluminum* for General Plant Maintenance

Put *Liquid Aluminum* to work in and around your plant and watch your maintenance cost go down. *Liquid Aluminum* is amazingly resistant to rust . . . resists corrosion from smoke and fumes, too. It reflects up to 85% of heat and light rays—makes plant interiors brighter—minimizes expansion and contraction problems—reduces storage tank evaporation losses. Look for the *Liquid Aluminum* label on the aluminum paint you choose for its countless uses inside and outside your plant.

This advertisement appears in the interest of the Paint Industry of America.

HOW MUCH DOES IT COST YOU...

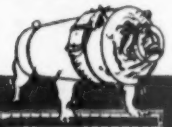
One failure of a pneumatic tool costs more than a line type Hi-eF Purifier! These low-cost units installed *immediately* ahead of the air tool keep out of the air line all dirt particles and moisture that materially shorten the life of pneumatic equipment—corroding and wearing out vital parts.

These amazing, low-cost units pay you a rich profit by adding months to the life of your air equipment. Installed in a matter of minutes, they have no moving parts—nothing to wear out, nothing to clog up. See your distributor today. Try one ahead of your most troublesome air tool. Mail coupon for literature and prices.

THE V. D. ANDERSON COMPANY
1997 West 96th Street • Cleveland 2, Ohio

It costs only $13.20 for this Hi-eF Purifier on a 3/4" line.

WATCHDOG *OF STEAM • AIR • GAS • VAPOR PIPELINES AND EQUIPMENT*



THE V. D. ANDERSON COMPANY
1997 West 96th Street • Cleveland 2, Ohio

Please send literature and prices on small line type purifiers.

Name ..... Title .....
Company .....
Address .....
City ..... State .....

BY THE MAKERS OF SUPER-SILVERTOP STEAM TRAPS

Begins on page B-144

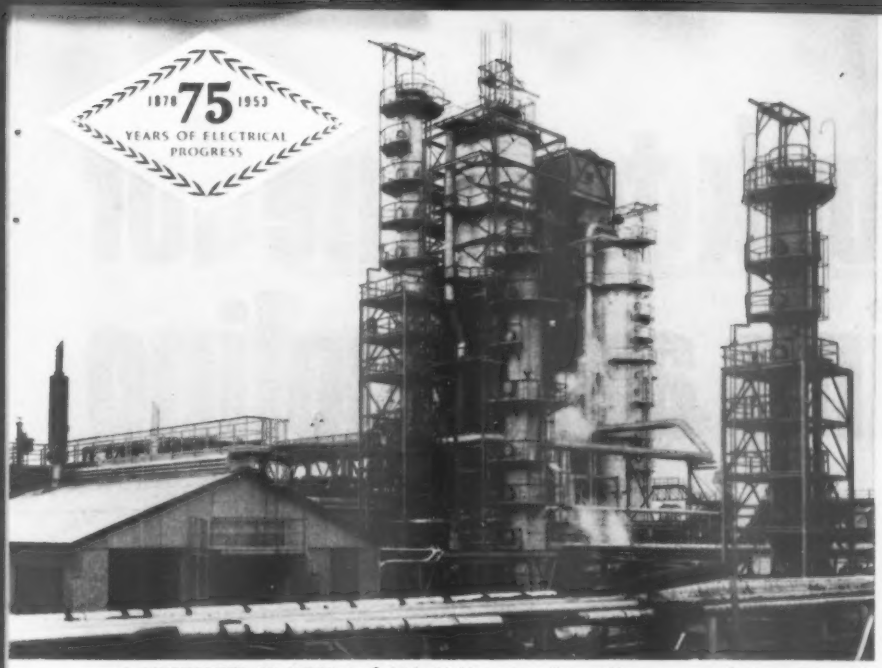
er structural members. Bus duct. Grid systems of piping and services. Provision for future drainage.

4. **Clients want pushbutton factories.** Automation is under way, as Tuttle sees it. His company also does process engineering.
5. **The trend is to lighter-weight exterior skins or curtain walls.** There are numerous applications of non-ferrous metal siding installed at less or no greater cost than for contemporary materials.

ger in an industrial company. with a strong building manager in an industrial company. He should have authority to act for the company. He should be able to get the facts and data needed by an engineering organization clearly and quickly.

7. **Top management ought to figure out what it costs not to have a new plant.** That's the right way to approach this whole problem.
8. **New construction methods, new building materials, and overtime** are often justified in order to get a plant built sooner.
9. **More on building manager:** Also put the building manager and his staff on full-time assignment with the designers. This speeds the design process and gets the job done right.
10. **Use of lightweight materials is growing.** Tuttle says a new aluminum siding can be rolled on and clicked in place.
11. **Elimination of insulation in panels is being studied.** The question is whether the cost of such insulation can actually be amortized by a saving in heat. There is some thought that insulation in the sidewalls should be skipped. Of course, the roof should be insulated. This would make sidewall con-

Turn to page B-156



MAINTENANCE IS VITAL in Sohio's highly automatic cracking process that requires only six men per shift. New Lima, Ohio plant operates around the clock, runs 16,000 barrels per day.

YEARLY OVERHAUL SCHEDULES are posted in key areas so that plant operating and maintenance personnel can project their requirements ahead.

Productive maintenance helps keep refinery "on stream"

Planned equipment overhaul and routine maintenance boost output at Sohio plant

The big catalytic cracker at the Standard Oil Company (Ohio) installation in Lima, Ohio, operates around-the-clock, running 16,000 barrels of gas-oil every day. It's a highly automatic process—and to keep "on stream," the refinery has set up their maintenance program for a year ahead on this vital equipment.

One reason for this program's success is the equipment record system developed by the maintenance department. Every piece of equipment in the refinery is marked with a plant record number. Inspection and routine maintenance schedules for all equipment are set up monthly, quarterly, and annually. These schedules are then co-ordinated with a "unit turnaround and shutdown schedule" which shows planned overhaul periods for the coming year.

As a result of this careful planning, more output is delivered with available equipment and men, and the work flow has been smoothed out. Maintenance has been made *productive*.

Is management in your plant "Maintenance Minded"?

If they aren't, you need to convince them of the importance of *Productive* Maintenance. General Electric can help you with a kit of Productive Maintenance information. It shows how a planned, systematic maintenance program can get more output from your existing equipment . . . reduce machine downtime . . . lower production costs. Ask your G-E Apparatus Service Shop representative to tell you more about *Productive* Maintenance—today! General Electric Company, Schenectady 5, N. Y.

SPECIFIC EQUIPMENT OVERHAUL is scheduled by plant area in this master book. Equipment is keyed to central file (below) by equipment record numbers.

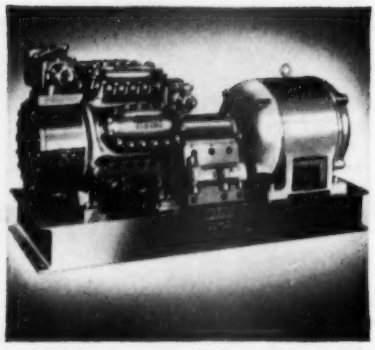
COMPLETE MAINTENANCE RECORDS for planned overhaul and routine maintenance as well as inspection are kept by record number in this central file.

NEW G-E KIT of maintenance information can help you win support for your maintenance ideas. It describes what *Productive* Maintenance is, how it works in typical plants, what it can do for you. Write to General Electric Co., Section 801-9, Schenectady, N. Y. Ask for GEZ-356.

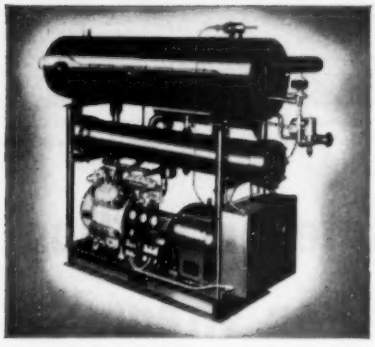
Maintain Optimum Production with Productive Maintenance

GENERAL ELECTRIC

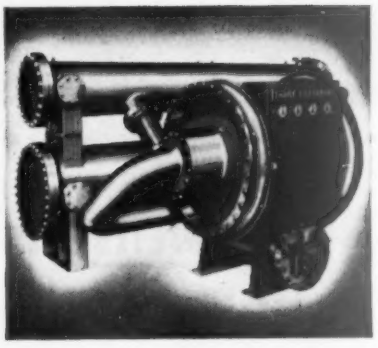
Look to Trane for of heating and cooling



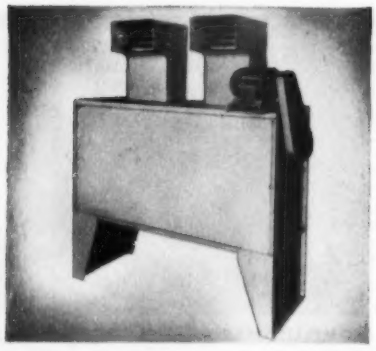
1 **To handle cooling requirements** from 3 to 50 tons, install this TRANE RECIPROCATING COMPRESSOR. It can help speed production, improve product quality, reduce spoilage, control moisture. Completely automatic. It operates on less power when cooling requirements are reduced. Costs less to operate. Gives longer service. The TRANE RECIPROCATING COMPRESSOR is available in 6 sizes.



2 **For chilled water** for comfort or process applications . . . this new TRANE COLD-GENERATOR is the answer. It's a single packaged unit. Arrives assembled, charged and tested. Every component factory engineered and exactly matched for peak performance. Requires only simple plumbing and electrical connections. This TRANE COLD-GENERATOR is available in 6 sizes from 10 tons up.

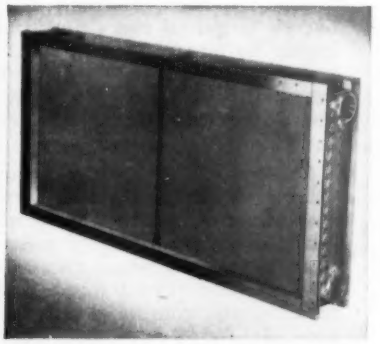


3 **For larger water chilling requirements** from 45 tons up—install the TRANE CENTRAVAC. These hermetic centrifugal units provide 45 to 200 tons of refrigeration—operate efficiently down to 10% capacity. They're self-contained and completely automatic. No shaft seals or gear boxes. Only one major moving part. The TRANE CENTRAVAC runs without special attention . . . saves on overhead.



7 **To obtain large volumes of heat,** whether to blanket a huge space or to spot into widely separated areas, there's nothing so versatile as the TRANE TORRIDOR. This blower-type unit can be used with or without ducts. And it comes in 5 basic models and 10 cabinet sizes with a wide range of accessories so that you can "tailor" it to fit your special needs, for either comfort or process application.

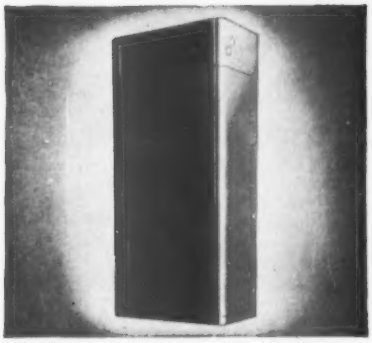
8 **If you want to move air**—TRANE has fans for every purpose . . . in a wide variety of sizes, models and types. For example, TRANE CENTRIFUGAL FANS are standard with forward-curved or backward-inclined blades. Class I and II construction . . . in all drive arrangements. Single and double width fan wheels with 12" to 109" diameters. Many optional features and accessories.



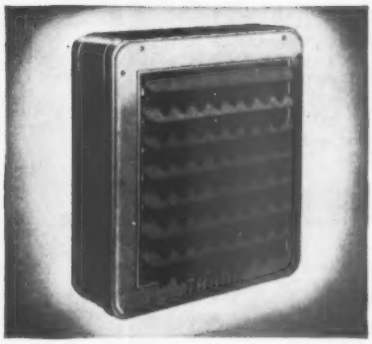
9 **For special heating and cooling applications,** TRANE COILS are available in thousands of sizes to meet exact requirements. There are cleanable-tube types. Non-freeze types. Direct-expansion types. High and low pressure types. Coils made of almost every common metal for use with almost any fluid or gas. All have permanently bonded fin-and-tube construction for maximum efficiency.

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING AND VENTILATING EQUIPMENT

the most complete line equipment...



4 **To air condition offices, lobbies,** drafting rooms, machine tabulating rooms and many others in your plant, there's nothing better (or simpler to install) than a TRANE SELF-CONTAINED AIR CONDITIONER. It's a complete system—in a package. Arrives ready to operate. Requires only simple electrical and plumbing connections to install. Available in six sizes, from 3 to 20 tons.



5 **To solve standard heating problems,** from drafty doorways and cold windows to large heat consuming areas or processing requirements, there's nothing better than this TRANE MODEL H UNIT HEATER. Its exclusive Louver Fin Diffuser puts heat right where it's needed—in a gentle blanket, a pinpointed spot or with a divided stream. And the adjustment takes but a minute.

6 **Where high ceilings, conveyors or overhead cranes** cause heat distribution problems . . . the most satisfactory answer is the TRANE PROJECTION HEATER. Thousands of factories have proved it. These powerful heaters operate from high out-of-the-way positions . . . salvage warm air otherwise wasted. Provide 60% greater throw, thanks to their exclusive Louver Cone Diffusers.

10 **For efficiency and economy in gas heating**—install this new TRANE GAS-FIRED UNIT HEATER. It's built like a boiler—no gaskets or furnace cement to cause trouble. Beaded and flanged connections throughout. Bigger, heavier, more powerful. Its broad fan *pushes* air instead of chopping it. Six sizes with input capacities ranging from 50,000 to 230,000 B.T.U./hr.

You never have to compromise when you select TRANE equipment. That's important. You get the exact size and type heating and cooling products you need.

The reason is simple. TRANE manufactures the most complete line of heating, ventilating, air conditioning and heat transfer products in the industry. A line that's grown largest because of quality, efficiency and popular demand.

Another thing. When you call your nearby TRANE office, you'll be dealing with a competent man . . . a *sales engineer*. He's experienced in industrial heating, cooling and ventilating. And his recommendations will be unbiased . . . he has a *complete* line on which to base them.

for the best answer to every heating and cooling problem

talk to.... **TRANE**

The Trane Company, La Crosse, Wisconsin • Eastern Manufacturing Division, Scranton, Pennsylvania • Trane Company of Canada Limited, Toronto • 87 U.S. and 14 Canadian Offices

6 Essential Facts

for a company with a Water Problem...

1. Costs Far Less to Install!
A Ranney Water Collector will add millions of gallons to your daily water supply—at a fraction of the cost of conventional systems!

2. Less Expensive to Operate!
A Ranney Water Collector is far less expensive to operate—uses fewer pumps, fewer personnel, less power, and usually requires no treatment facilities.

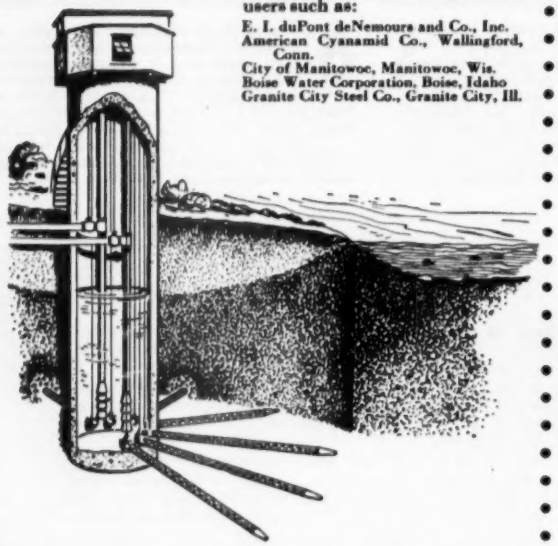
3. Maintenance Requirements Practically Nil!
A Ranney Water Collector requires little or no maintenance. The rate of flow through the Ranney Collector's apertures eliminates clogging and silting. No filter plant maintenance.

4. More Water per Unit!
A single Ranney Water Collector has produced more clear, cool water than ten conventional vertical wells.

5. Far Longer Life Cuts Depreciation Costs!
The longer life of a Ranney Water Collector lowers financing and depreciation rates appreciably.

6. Ask These Satisfied Users
Ranney Water Collectors are currently rendering excellent service to scores of large water users such as:

E. I. duPont deNemours and Co., Inc.
American Cyanamid Co., Wallingford, Conn.
City of Manitowoc, Manitowoc, Wis.
Boise Water Corporation, Boise, Idaho
Granite City Steel Co., Granite City, Ill.



An inexpensive Ranney survey will determine how the Ranney Method can work for you.

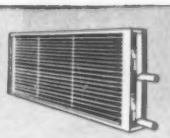
If you need water, write us for complete information on how a Ranney Water Collector will solve your problem.

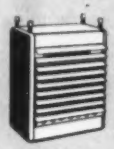
Ranney Method Water Supplies, Inc.

HYDROLOGISTS AND WATER SUPPLY CONTRACTORS

Executive and Engineering Offices
Dept. D-5, P.O. Box 277, Columbus 9, Ohio

U.S. AIRCO
EVERYTHING IN AIR CONDITIONING


Coils


Gas Fired Unit Heaters

Engineers and manufacturers of a complete line of finest quality heating, ventilating and air conditioning equipment.

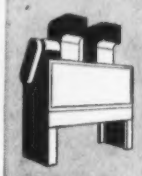
Write Dept. FM-553

Ventilating Blowers

Evaporative Condensers

Housed Ventilating Sets

Modu-aire


Blower Heaters

U.S. AIRCO
UNITED STATES AIR CONDITIONING CORP.
MINNEAPOLIS 14, MINNESOTA

Combat HEAT FATIGUE with

PEP-UP®
IMPREGNATED
Salt Tablets

Will not cause Nausea or Stomach Distress

- Salt lost through perspiration causes fatigue and heat exhaustion. Vigor and vitality can be increased—fatigue and heat prostration can be eliminated by taking PEP-UP Impregnated Salt Tablets.
- Meets Government Specification No. SS-S-31D.

Write for literature and prices

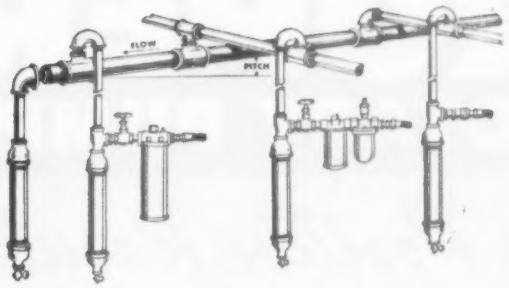
EXPENDABLE DISPENSER

PEP-UP Impregnated Salt Tablets come to you in sanitary, factory sealed dispensers at no extra cost.

UNITED STATES SAFETY SERVICE CO.
KANSAS CITY 6, MISSOURI · BRANCHES IN PRINCIPAL INDUSTRIAL CITIES
In Canada PARMELEE, LTD. Toronto — Montreal

HANSEN REPRESENTATIVES
Quick-Connective Couplings
Are Their Business
BUT SO ARE FLUID LINE PROBLEMS

To Avoid Air Line Troubles



GEORGE W. WARDEN
Geo. W. Warden Co., Seattle
Maintains close contact with fluid line installations in plants throughout Pacific Northwest.

EDWARD BURKE
The Burke Co., San Francisco
Offers years of practical experience in handling of vacuums, compressed air, gasses and liquids. Author of engineering manual on aircraft hydraulics.

CHESTER CAUGHRON
Chester Paul Co., Glendale
Supplies pneumatic and hydraulic equipment to practically every type of industry in the thriving Southern California area.

...use the on-the-job know-how of the HANSEN Representative

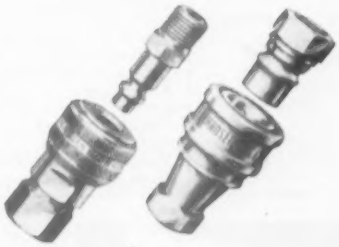
By the very nature of his job, the Hansen representative is thoroughly familiar with practically every type of air line hook-up. He knows what works—and why it does. Frequently, the remedy for your difficulties, drawn from his experience in dozens of plants, is very simple.

When you need help over the rough spots—either when actual troubles arise, or when air line circuits are being planned or altered—give him a call. Believe us, you'll welcome the help that he can give you.

REPRESENTATIVES

BALTIMORE	DETROIT	NEW ORLEANS
BIRMINGHAM	FT. WAYNE	PITTSBURGH
CHICAGO	HARTFORD	ROCHESTER
CLEVELAND	KANSAS CITY	SAN FRANCISCO
DALLAS	LOS ANGELES	SAVANNAH
DAYTON	LOUISVILLE	SEATTLE
DENVER	MILWAUKEE	ST. LOUIS
	MINNEAPOLIS	

MONTREAL • TORONTO • VANCOUVER
Export Department: Cleveland

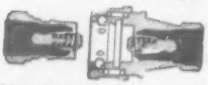


QUICK-CONNECTIVE FLUID LINE COUPLINGS

1. QUICK CONNECTION AND DISCONNECTION **2.** INSTANT AUTOMATIC FLOW OR SHUT-OFF

One-Way Shut-Off

Two-Way Shut-Off



ALSO STRAIGHT-THROUGH QUICK-CONNECTIVE COUPLINGS
Send for Catalog!

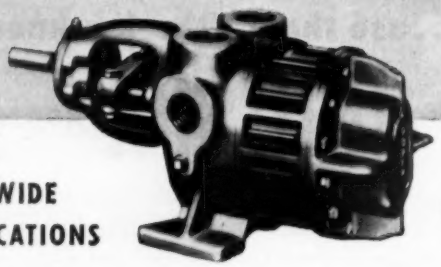
THE HANSEN MANUFACTURING COMPANY
4031 WEST 150th STREET • CLEVELAND 11, OHIO

Install

ROPER

ROTARY PUMPS

for Positive Results



MODELS FOR AN EXCEPTIONALLY WIDE RANGE OF APPLICATIONS

SERIES F PUMP

SERIES	TYPICAL USES	PRESSURES	SIZES
3600	All Petroleum Handling Grease Compounding Oil Circulating General Transfer	to 60 P.S.I.	40-300 G.P.M.
F	Pressure Lubrication Hydraulic Power Fuel Transfer Lube Oil Transfer	to 300 P.S.I.	1-300 G.P.M.
K	Pressure Lubrication Hydraulic Service Industrial Oil Burner Fuel Supply	to 150 P.S.I.	¾-50 G.P.M.
H	Hydraulic Power Test Equipment Pressure Lubrication High Pressure Coolant	to 1000 P.S.I.	5-75 G.P.M.

NEW! LATEST EDITION OF THIS BOOKLET NOW READY FOR YOU! SEND FOR YOUR FREE COPY

A valuable guide covering important fundamentals of estimating requirements of the average pumping job. It includes tables, charts, sample problems, and other pertinent data. SEND COUPON BELOW.

Geo. D. Roper Corporation, 185 Blackhawk Park Ave., Rockford, Ill.

Please Send Booklet—"How to Solve Pumping Problems"

NAME.....

ADDRESS.....

CITY..... STATE.....

ROPER Rotary Pumps

struction infinitely cheaper.

12. **There is a moderate trend to factory air conditioning.**
13. **Fancier lounges and employee recreation facilities** are in order. Tuttle says industry will spend more and more money for employee comfort, convenience, and recreation.
14. **Noise control is a big problem in industry today.** There are several ways to control noise to a reasonable degree. Considerable study is being made of the problem now. Extremely noisy operations (140 decibels or higher) can be completely isolated. Typical operations would be engine-testing operations and certain press operations. Otherwise, big noisemakers can be put in separate buildings, isolated with soundproof partitions, quieted with baffles suspended from the ceilings. Or they may be put in completely suspended rooms.
15. **The trend is toward positive pressure in plants.**
16. **The public is forcing waste control and dust and fume control.**
17. **Packaged treatment plants are becoming available.** Continuous metering of the effluent for biological oxygen demand and Ph is growing. Oversize treatment plants are generally installed.
18. **Better maintenance facilities.** Maintenance men are getting their own washrooms and training rooms. They are better equipped and getting more recognition. Better offices for the plant engineer and his engineering and supervisory staffs.
19. **Instead of maintaining machines on the production line,** banks of spare machines used in quantity are being established. For example, screw machines. The idea is to put the machine on a movable base and yank it out for

O-B VALVES

Industry depends on O-B valves for both the tough and easy jobs. Cast of high-grade steam bronze, this No. 16 Line solder-type valve--safe for steam up to 125 pounds--has the same fine quality found in all O-B valves. O-B valves are available for nine out of ten industrial applications. Ask your local distributor about them today.

Ohio Brass

MANSFIELD OHIO, U. S. A.

BRONZE GLOBES, ANGLES, GATES AND CHECKS FOR INDUSTRIAL SERVICE

4370-V

ALL HANDS ARE "SKILLED HANDS"

WITH

ANSUL DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT

With Ansul Extinguishers near-expert results are obtained by inexperienced operators. In fact, all Ansul Extinguishers are designed to provide a maximum of extinguishing effectiveness in the hands of inexperienced personnel.

This feature, plus benefits listed below, account for the outstanding preference for Ansul Equipment by fire protection men in all phases of American industry.

Send for File No. 802. You will receive a variety of helpful printed matter. Included is our latest catalog which describes Ansul Extinguishers of all sizes — from the small Ansul Model 4 to Ansul Piped Systems and Ansul 2000 lb. Stationary Units.

1. Water-tight construction throughout.
2. Easy on-the-spot Recharging (No tools needed.)
3. Quick, positive puncture operation.
4. Special cartridge guard protects cartridge . . . rugged construction throughout.
5. Ansul *"PLUS-FIFTY"* Dry Chemical used exclusively.
6. Corrosion resistant construction throughout.
7. Greater fire-stopping power.
8. Field tested by thousands of satisfied customers.

OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES IN THE U. S. A., CANADA AND OTHER COUNTRIES

ANSUL Chemical Company

FIRE EQUIPMENT DIVISION • MARINETTE, WISCONSIN

MANUFACTURERS OF DRY CHEMICAL FIRE EXTINGUISHERS, INDUSTRIAL CHEMICALS, SPECIAL CHEMICALS, REFRIGERANTS AND REFRIGERATION PRODUCTS • DISTRIBUTORS OF DU PONT "FREON" REFRIGERANTS

Begins on page B-144

maintenance back in the shop. It is replaced with another machine which has been brought up to standard and is ready as a substitute.

20. **Speed of construction has generally been based on steel deliveries.** Now that's about six months. Tuttle anticipates shorter delivery dates. As the availablity of steel improves, a greater tendency will develop to design plants completely before letting the contracts in order to get competitive bids.
21. **Bricklayers cost too much.** G & V has used a lot of block in its designs.
22. **The use of aluminum roof deck will grow.** It's lightweight, doesn't need painting, resists corrosion, and has some insulating value.
23. **Insulation is being improved from the standpoint of rigidity.** One problem in early installation of glass-fiber roofs was the sponginess characteristics exhibited by such groups. This material is now being made in more rigid form. It has proved excellent. It's lightweight, and its cost is reasonable.
24. **More roof structures are being designed in the plants.** These are for fan rooms, air conditioning rooms, ovens, unit substations, and so forth.
25. **Use of modular design will grow,** based on quick availability of good, standard materials. Usually these modules are based on 8-ft. increments. Expansion is made easier by designing basic services for it. This is done by designing and allowing extra capacity in piping and wiring — by carefully working out sizes in advance. By planning for the direction of expansion. By designing buildings to take expansion. By laying buildings out properly on the plot. By providing temporary walls. By prepunching steel

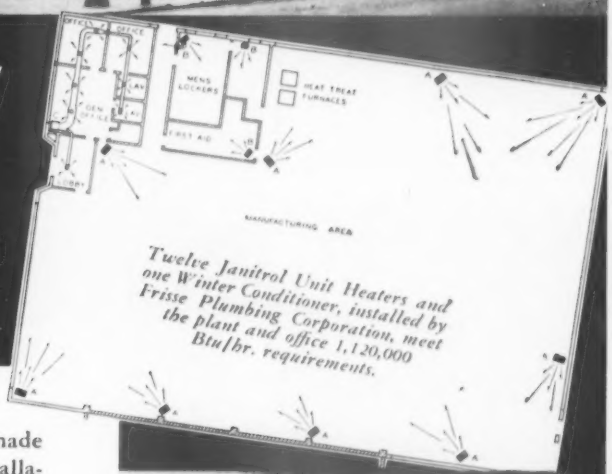
SAVE HALF* INSTALLATION COSTS

Get Better Heating!

Vahl Engineering Company, Plant, Brooklyn, N. Y. Brown and Matthews, Inc., Contractors.

Janitrol

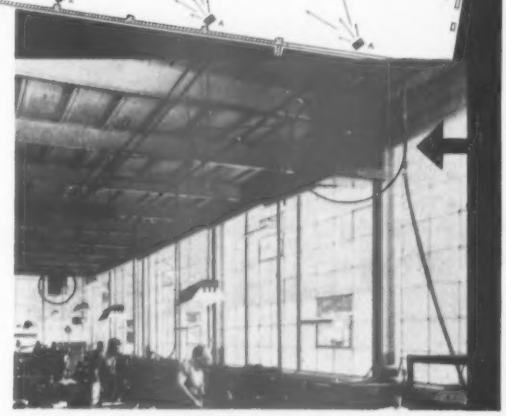
GAS UNIT HEATERS PROVIDE IDEAL WORKING CONDITIONS



Twelve Janitrol Unit Heaters and one Winter Conditioner, installed by Frisse Plumbing Corporation, meet the plant and office 1,120,000 Btu/hr. requirements.

In addition to important dollar savings made possible by the original Janitrol Unit Heater installation, prime consideration was given to efficient heating to assure the best possible working conditions. While the large glass wall areas provide excellent natural light for precision manufacturing operations, heat loss is high. However, unit heaters are located and heat is directed where heat loss is the greatest, so that temperatures remain even throughout the entire manufacturing area.

When you specify gas unit heaters for plant, store, or any type of industrial or commercial building, it pays to find out why Janitrol's advanced design and construction make these units the first choice of "men who know heating best."



Part of manufacturing area. Suspended unit heaters amply compensate for heat loss from large glass areas.

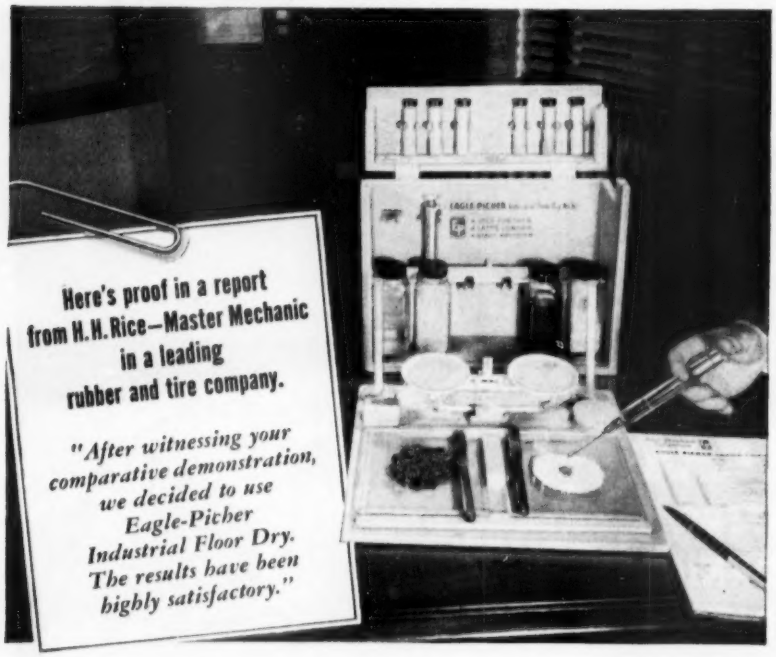
WRITE TODAY FOR YOUR COPY OF BUSINESS-MAN'S BLUE BOOK OF BETTER HEATING

It gives numerous examples of correct unit heater installation practices to assure efficient heating with real operating economy.

*Actual Savings 49% Facts and Figures Available on Request. Ask for Bulletin 49.

SURFACE COMBUSTION CORPORATION • TOLEDO OHIO

There's a big difference *in floor absorbents*


Here's proof in a report from H. H. Rice—Master Mechanic in a leading rubber and tire company.
"After witnessing your comparative demonstration, we decided to use Eagle-Picher Industrial Floor Dry. The results have been highly satisfactory."

You, too, can witness the difference in floor absorbents! With his portable laboratory, your Eagle-Picher man will analyze your floor absorbent *right in your office.* You may actually conduct the test yourself! Without obligation, of course.

Here's what the test shows—

- The amount of oil and water absorbed for given bulk.
- The cost of your absorbent in terms of absorption and coverage.
- The amount of coverage you're getting.
- The benefits of your absorbent in terms of safety and reflective ability.

You'll see that Eagle-Picher Floor-Dry is insoluble, chemically inert and non-combustible . . . that it combines light weight for exceptional coverage with light color for brighter, safer working areas. Write today for the full story.

EAGLE-PICHER INDUSTRIAL FLOOR-DRY No. 85

EAGLE EP PICHER

Since 1843

THE EAGLE-PICHER COMPANY
General offices: Cincinnati (1), Ohio

Begins on page B-144

frames for future connection. By allowing adequately for expansion joints.

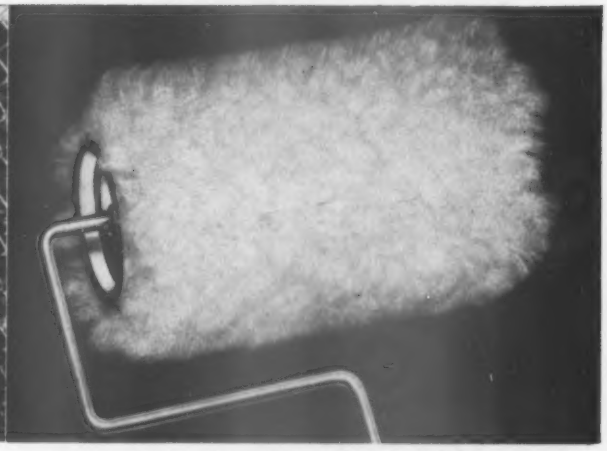
26. **Some things are being done for low-cost maintenance.** This is a toughie because it depends largely on the process. Do you have lots of smoke, abrasive metals, dust, fumes, volatile materials, etc.? You can do these things: Cut down on window areas. Use non-ferrous materials exposed to the weather. Use things like aluminum sash. Use stainless steel where possible.
27. **Incidentally, stainless steel has been used for spandrels, purlins, and other structural members over corrosive atmospheres.**
28. **Water supply is increasingly critical.** Serious site searches and surveys are being conducted for water supply.
29. **Giffels & Vallet likes to work** with an able manager in its industrial plant planning. It wants the manager to be able to interpret and speak for hot-shot production engineers, plant manager, safety engineer, industrial relations and personnel people, maintenance superintendent, and so forth. G&V is pleased to advise these people individually, but feels the owner's time is wasted if they are required to stand by while the departments organize and reorganize in open meeting. A strong building manager can make decisions and not have to buck problems upstairs.
30. **Here's an idea on engineering lead time for plant construction.** If the production layout is ready, it takes outside engineers a month to two months to get things in pretty good order. If the production layout is not ready, it takes from three to six months to get drawings for bids.

Turn to page B-164

Cut wire fence re-coating costs!

Users Report Savings of 30% to 40% With Rust-Oleum Extra-Long Nap Lamb's Wool Roller!

Special roller glides easily over wire sections. (Rusted sections have already been primed with Rust-Oleum 769 Damp-Proof Red Primer to Stop Rust.) Finish coat is Rust-Oleum 470 R.M. Aluminum.



A *new, exclusive, different-type* roller! Greater diameter, specially selected skins, extra-long Lamb's Wool – all combine to give you more coverage faster and easier in the new Rust-Oleum Roller-Coating System.

Close-up shows how Extra-Long Nap Wool reaches around to coat approximately 70% of other side of fence at same time. Rust-Oleum's *exclusive* penetrating qualities saturate cross wire sections for desired mil thickness.

Man follows with "dry" roller on opposite side of fence to catch and use surplus "tears" and quickly coat remaining 30% of wire sections.

Even barbed wire sections can be roller-coated in one easy pass. 99% of the material is used on the fence – *not* on the workers, *not* on the ground.

On long distances of fencing, a 5 man production "team" can achieve even greater savings. The first man wirebrushes the surface to remove dirt, dust, rust scale, etc. The second man applies Rust-Oleum liberally by roller, coating the wire sections and barbed wire. The third man follows on the opposite side of the fence with a "dry" roller to catch and use the surplus. The fourth and fifth men work on opposite sides of the fence, brushing the pipe framework and the barbed wire arms. See how this new Rust-Oleum system can save you money. Attach coupon to your letterhead, mail *today*.

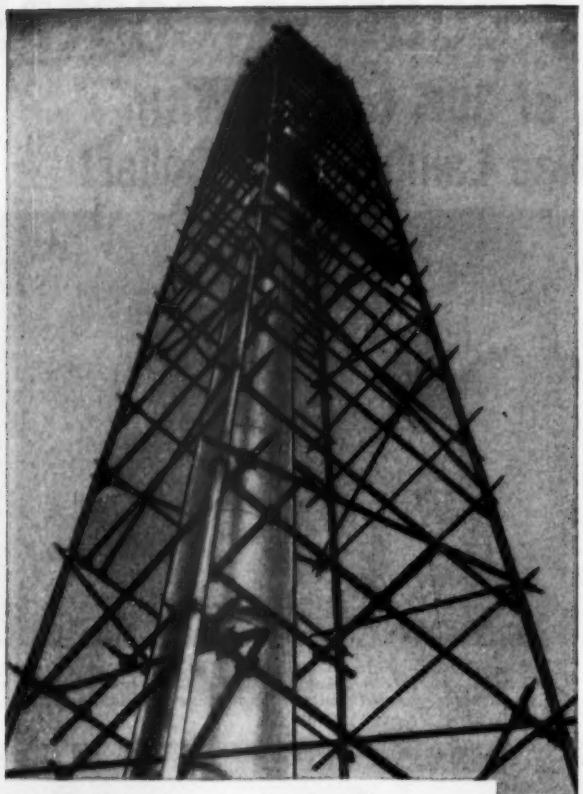
RUST-OLEUM®

STOPS RUST!

ATTACH TO YOUR LETTERHEAD - MAIL TODAY!

RUST-OLEUM CORPORATION
2454 Oakton Street, Evanston, Illinois

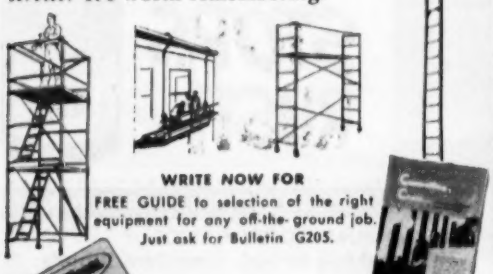
Please show us how your new Extra-Long Nap Lamb's Wool Roller will cut our wire fence re-coating costs. Include prices, complete literature about Rust-Oleum and nearest source of supply. We have approximately_____ yards of wire fencing.



How To Keep Costs Down . . . When Maintenance Goes "Overhead"

When labor goes off the ground, costs and risks go up too!

Patent Scaffolding will save you time and money in all phases of off-the-ground maintenance — painting and cleaning; electrical work, machinery maintenance and many other jobs! Yes, and increase safety at the same time! . . . PS has exactly the *right* scaffolding to fit the job — *and the only complete scaffolding service!* It's worth remembering.



WRITE NOW FOR
FREE GUIDE to selection of the right equipment for any off-the-ground job. Just ask for Bulletin G205.

For Greater Safety... Efficiency... Economy

THE PATENT SCAFFOLDING CO. INC.

38-21 12th Street, Dept. FM&M, Long Island City 1, New York
West Coast Plant: 6931 Stanford Ave., Los Angeles, Cal. Offices in Principal Cities

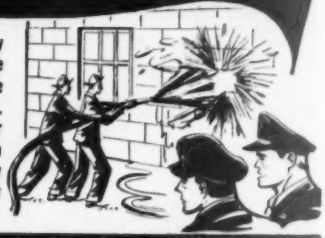
DEALER FRANCHISES AVAILABLE IN SOME AREAS

We're Testing *Everseal*

INVISO

The Invisible Water and Moisture Repellent!

The U.S. Army and U.S. Navy subjected Inviso to severe tests — and found it to be completely water repellent. It can be used on exterior masonry—equally effective on cinder block. Comes ready for easy application by spray gun or brush.



Some Other Products for Good Maintenance

1. FRIGID SEAL. Sealing and caulking compound which remains workable to 92°F. below freezing.

2. EVERKROME. Rust-inhibiting primer. Outdates ordinary red lead paints.

3. CINDER BLOCK PAINT. Seals the surface with weatherproof and decorative finish.

4. RUBBER BASE ENAMELS. Acid, alkali and water-resistant coatings for use on any surface.

5. ANTI-FUNGUS PAINTS. Extremely resistant to mildew and fungus. Colors.

6. 3-WAY FLAT WALL PAINT. Primes, seals and finishes all surfaces in one coat.

Send For More Information Today!

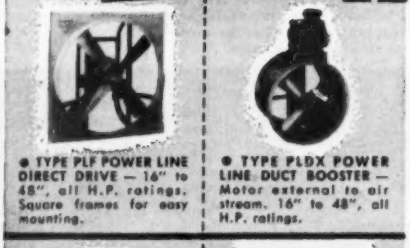
Clip this ad to your letterhead and mail to: #D

Everseal
MANUFACTURING COMPANY, INC.
250 WEST 57th STREET • NEW YORK 19, N. Y.

NEW! HEAVY DUTY CHELSEA FANS

-for every industrial application!

POWER LINE



● TYPE PLF POWER LINE DIRECT DRIVE — 16" to 48", all H.P. ratings. Square frames for easy mounting.

● TYPE PLDX POWER LINE DUCT BOOSTER — Motor external to air stream. 16" to 48", all H.P. ratings.

● TYPE PLDU POWER LINE AIR BLASTER — For spot cooling — available on pedestal. 18" to 42", all H.P. ratings.

● TYPE PLBD POWER LINE BELT DRIVEN—24" to 48", all H.P. Square frames for easy mounting.

—solve your ventilation problems

with CHELSEA'S new heavy duty airfoil type exhaust fans. For use in exhausting, duct work, filter installations, range or vat hoods, penthouse units, paint spray booths, where static pressure is encountered. All ratings are certified by P.F.M.A. test methods to insure proper performance.

Write for Catalog No. 400 address Dept. U-5

CHELSEA FAN & BLOWER CO., Inc.
PLAINFIELD, NEW JERSEY

We're TOPS!

"I'M DOUBLY STRONG BECAUSE I'M THE ONLY GUY WITH TWO EXTRA-DUTY CATHODES AT EACH END"
"AND I'VE GOT A BIGGER, STRONGER, LONG-LIFE FILAMENT"
DURO TEST
DURO-TEST

"Built Stronger To Burn Longer"

Duro-Test lamps are built to *last* and *last* . . . they're specifically designed to meet the tough operating conditions of commercial and industrial installations.

Their rugged construction means fewer replacements, fewer man-hours lost in maintainance . . . they cost less because they last longer.

Write today for complete details and your Duro-Test Catalogue.

Manufacturer of incandescent and fluorescent lamp bulbs.

DURO-TEST CORPORATION

North Bergen, New Jersey

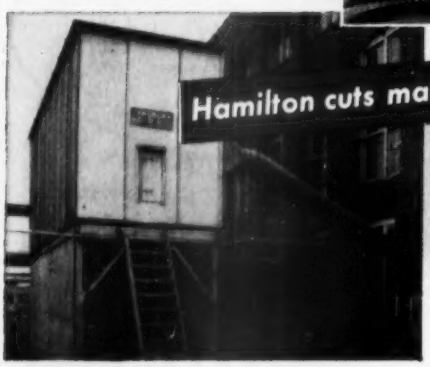
How Can Pangborn Dust Control Save You Money?

Here's how these firms saved with Pangborn:

Nalco salvages $50 a day

National Aluminate Co., Chicago, Ill., **uses seven Pangborn Dust Collectors to trap valuable chemical dusts at the source . . . saves well over $50 a day. Nalco reports that reclamation savings "have already paid for the Pangborn Collectors."**

Hamilton cuts maintenance $100 a month



Hamilton Rubber Co., Trenton, N. J., **installed Pangborn Dust Control to improve employee morale and reduce plant housekeeping. Pangborn did this and more—savings in maintenance, housekeeping, and machine repairs give Hamilton a bonus of $100 a month!**

THE case histories above tell our story. Whether you want to increase profits by reclaiming valuable dust or cutting maintenance costs . . . whether you're interested in improving working conditions or community relations . . . whether your needs are big or small, Pangborn will solve your dust problem. For information on how Pangborn can save you money, mail the coupon below now!

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning equipment

Pangborn DUST CONTROL

STOPS THE DUST HOG from stealing profits

MAIL THIS COUPON TODAY for more information on Pangborn Dust Control.

PANGBORN CORPORATION,
2100 Pangborn Blvd., Hagerstown, Md.

Gentlemen:

Please send me Bulletin 909A without obligation.

Name.....

Firm.....

Address.....

City.....Zone.....State.....

FIELD REPORTS

Begins on page B-144

Field Report No. 3

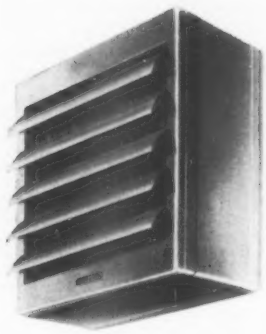
Interview with Allan H. Gillmore, President, The Gillmore-Olson Company, Cleveland. By Midwestern Editor Bob Dilley.

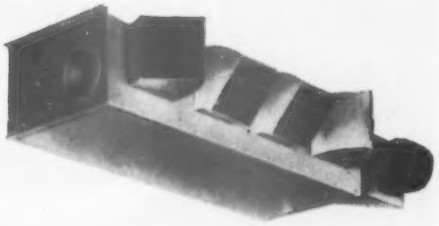
Buildings and grounds

1. **There are many kinds of curtain walls.** In effect, the term means non - load - bearing walls. And there are few plants built today with load-bearing walls. Therefore, the buyer must specify any one of several types.
2. **Panels of all types have proved disappointing** to builders from the cost standpoint. Gillmore says buyers today want the cheapest possible construction they can get commensurate with the tasks involved. He says you can't beat a block wall from the cost standpoint, and with application of several good concrete paints, such a wall becomes reasonably watertight. Precast concrete panels are used in areas where mixing and casting plants are close to the erection site. But transportation costs are almost prohibitive as that distance increases.
3. **Structural strength for expansion.** This is included in the frame as a matter of habit to accommodate cranes, tramrails, and plant service equipment. Ordinarily Gillmore likes to figure for the inclusion of specific items.
4. **Easier - to - operate doors.** Problem here is cost, and few companies have seen fit to include any of the mechanical doors currently available. However, he thinks it advisable where traffic between areas is heavy, to have doors operated mechanically by pedestrians or truck drivers.
5. **More efficient receiving and shipping docks.** There is no

Turn the page

Whether you heat Over Head...





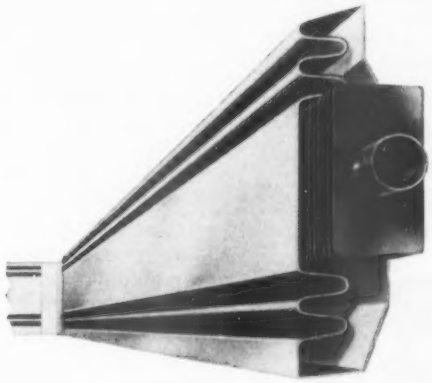
FOR SHIPPING AND RECEIVING DOCKS OR FOR SPOT HEATING

Dunham Propeller Fan Unit Heaters are available in a full range of sizes and capacities . . . in both horizontal and vertical discharge types . . . for steam and hot water. Cast bronze, non-corrosive header gives extra years of service. Slow speed fan, resiliently mounted motor, tight yet adjustable louvers assure quiet operation.

FOR LARGE AREA AND WAREHOUSE HEATING AND VENTILATING

Dunham Blower Unit Heaters move large volumes of air quietly, accurately, efficiently. Maintain perfect balance between air temperatures and velocities. All working parts removable. Five different types of mountings. For steam or hot water. Nozzles, dampers, filters, duct connections available.

Or heat Along the Wall



FOR GENERAL AND EXECUTIVE OFFICES

Attractive Dunham Baseboard Radiation is easy to install with frame or masonry construction. Heavy gage front section clips onto back section, fits flush with floors, permits wall-to-wall carpeting. No "cleaning under" problems. Unique design completely conceals heating fins, pipe and piping connections. Can be painted. Full line of accessories.

FOR PRODUCTION AND ASSEMBLY LINE AREAS

Dunham Fin-Vector Radiation is the ultimate in low-cost along-the-wall heating. Easy to install, any height 4 inches from floor. Light weight, requires few supports, little on-the-job cutting. Exclusive hook-and-link hanger saves installation time, trouble. Three cover designs: Sloping Top, Flat Top, Expanded Metal Top—for 1, 2 or 3-tier installations.

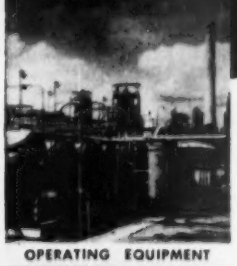
you can depend on DUNHAM

FOR ALL YOUR HEATING EQUIPMENT NEEDS

C. A. DUNHAM, 400 W. MADISON ST., CHICAGO • TORONTO • LONDON

QUALITY ARco SERVICE

THE SYMBOL OF
HIGHEST PROTECTIVE POWER
AGAINST CORROSION!

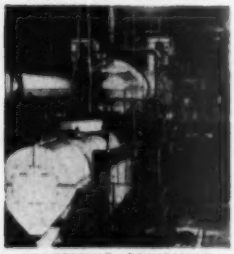

OPERATING EQUIPMENT

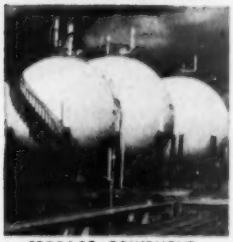
ARco RUBBER COVERINGS
...formulated to do the job!

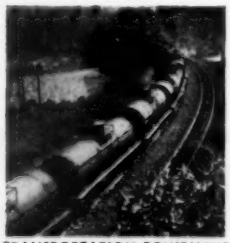
● From 10 gallon drums to large storage tanks . . . from pipes and fittings to expansive exhaust systems . . . ARco rubber coverings protect this equipment and produce money-saving results everywhere in the chemical industry.

ARco Engineers will design, fabricate, insulate and erect complete ventilating, storage and processing installations . . . or, they will cooperate with your equipment manufacturer in making your systems corrosion-proof.

Whatever your requirements may be, ARco rubber coverings can help you reduce maintenance costs and increase production.


PROCESSING EQUIPMENT


STORAGE EQUIPMENT


TRANSPORTATION EQUIPMENT

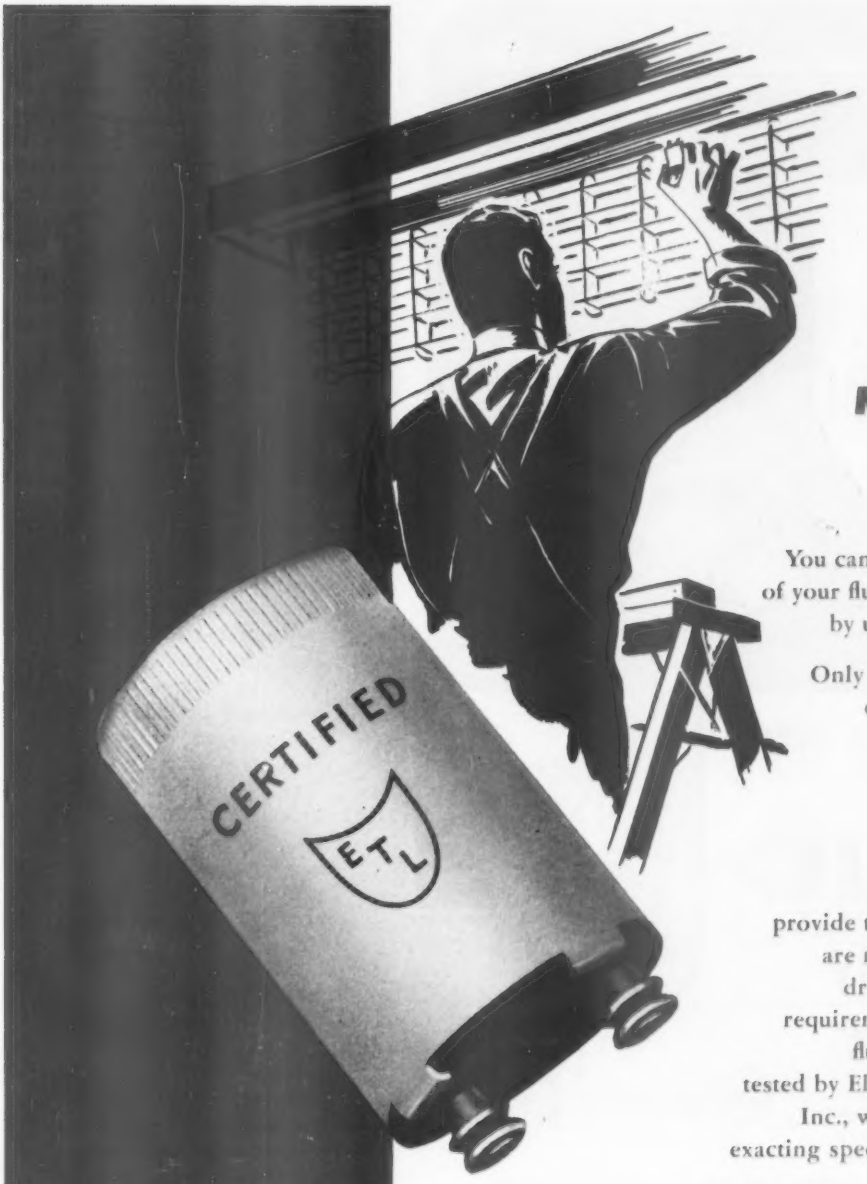
Write for this valuable literature today. Get this important information on the values and services offered by ARco rubber linings to the chemical field.

LICENSED SARAN APPLICATORS
AUTOMOTIVE RUBBER CO., INC.
8615 EPWORTH BLVD. DETROIT 4, MICHIGAN
●
ARCO RUBBER PROCESSORS
4033 HOMESTEAD ROAD • HOUSTON, TEXAS
ANYTHING CAN BE COVERED WITH RUBBER — BY ARco
MANUFACTURERS • DESIGNERS • ENGINEERS

Begins on page B-144

question that enclosure is desirable in the northern latitudes. More and more plants have enclosed truck and rail docks. In urban areas off-street parking for trucks is absolutely essential. Gillmore-Olson recommends that clients double the space they think is necessary for truck loading and unloading if they generally estimate their needs are small. For example, if a client needs room for two trucks, he is urged to provide for at least four. The growth in truck transportation over the past decade shows its importance.

6. **Window treatments in heat-absorbent and glare-proof glass.** The trend is away from windowless plants. Because humans are humans, managements have found it necessary to provide at least for minimum vision. Sealed windows now make it possible to erect large glass-panel areas with good insulating value.
7. **The use of glare-reducing glass has been growing.** G-O recommends it generally for western exposures and occasionally for southern exposures. There is no question that it aids seeing comfort.
8. **The growth of the use of aluminum sash** has been amazing, and G-O recommends it over other materials when possible. Of course, this means the puttyless type sash, with minimum maintenance.
9. **Easier-to-maintain floors.** For office floors, we think vinyl tiles will gain acceptance fast. The price is still high, but the vinyl tiles have several distinct advantages. Furniture doesn't mar or dent the material. It has a hard surface that doesn't need waxing, but can be waxed.
10. **For factory floors,** surface-hardened concrete seems to be the thing. G-O is using less wood block in floors ex-



How TO CUT FLUORESCENT MAINTENANCE COSTS...

You can reduce the maintenance cost of your fluorescent lighting installation by using starters that last longer.

Only **CERTIFIED STARTERS** can assure you of:

1. At least 36,000 starting operations
2. Full lamp life

CERTIFIED STARTERS provide these advantages because they are made to precise specifications drawn to the particular starting requirements of each size and type of fluorescent tube. They are then tested by Electrical Testing Laboratories, Inc., which certifies they meet these exacting specifications.

You'll get better fluorescent performance and lower maintenance costs by using

Certified Starters

Certified Fluorescent Starter Manufacturers

2116 KEITH BUILDING · CLEVELAND 15, OHIO

It's a lot easier to work with

RIDGID

Extra-Utility Pipe Vises

Compare those work-saver RIDGID Vises with any others and you see the bonus of extra utility you get for your money. Kit vise is easily toted to the job, quickly clamped on edge of bench or plank, ready to use. All other RIDGID vises have handy integral pipe benders and rests to make cutting and threading easier. Full-width firm-gripping jaws of top quality tool-steel, bodies of rugged special malleable—for years of service. 9 models, yoke and chain, 23 sizes, meet every need. Get your money's worth—buy RIDGID Vises at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

FIELD REPORTS

Begins on page B-144

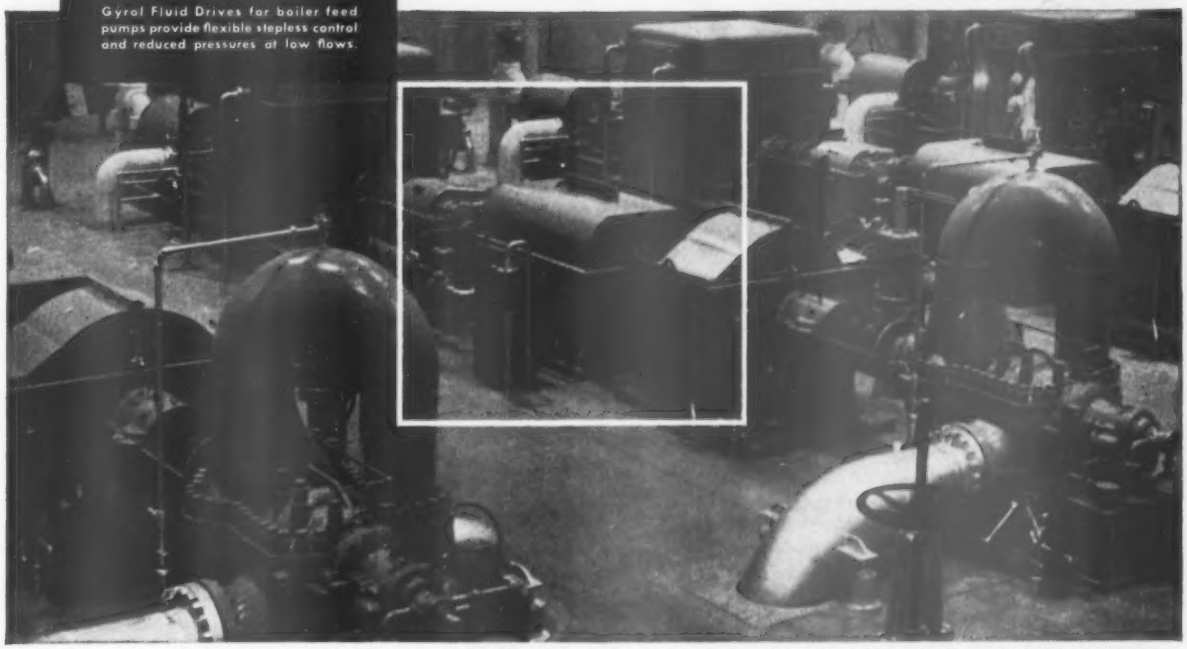
cept where design requires it.

11. **Floors suited to mechanized cleaning.** Polished concrete and terrazzo are, of course, excellent materials for use where cleaning is important.
12. **Corrosion-resistant concrete.** Hydrofluorous silicate is the standard hardener used and it will resist corrosion. G-O hasn't used anything else.
13. **Longer-lasting, easier-to-maintain roofing.** The trend is somewhat away from poured gypsum because it is so hard to install in the winter. G-O is using more steel deck because it goes down fast. And corrugated aluminum both for roofs and for siding where heat loss isn't a factor. It goes up fast and provides maximum protection without maintenance. Built-up roofs above the deck are still considered most practical.
14. **Color conditioning.** G-O is painting more plants and more machines with colored paint these days. Everything of a dangerous nature is painted fire-engine red. Green appears to be the accepted wall and trim color in its various shades.
15. **Easier-to-maintain wall materials.** This is covered partially under item 1. Clients seem to want the least expensive plants they can get regardless of what is better in the long run, and so G-O is using concrete block, painted. There are some excellent salt-glazed and ceramic tiles available for sanitary areas. He thinks their use is growing.
16. **More flexible partitions.** Industry's need for movable partitions appears to be growing. They look neat and can be maintained easily, and they are available in sizes and shapes to meet most needs. There seems to be a trend toward the half-partitions going up two-thirds or three-fourths of the distance to the

GYROL Fluid Drive

controls river of water to cool hot Plutonium

Gyrol Fluid Drives for boiler feed pumps provide flexible stepless control and reduced pressures at low flows.



Pumping equipment for reactor cooling at Hanford Works, Richland, Washington. Operated for the AEC by the General Electric Company.

SO HIGH ARE THE TEMPERATURES around the nuclear reactors, or atomic "piles," that large, dependable, accurately and automatically controlled flows of pure high-pressure water are required for reactor cooling.

American Blower Gyrol Fluid Drive acts as the traffic cop for this mighty river of water. Remotely controlled, the fluid drive permits operation of the flywheel and feedwater pump at *variable* speeds (depending on water volume); also saves power by allowing the unit to start with the load disconnected.

This unique installation, first of its type in this country, is another example of American Blower leadership in power transmission.

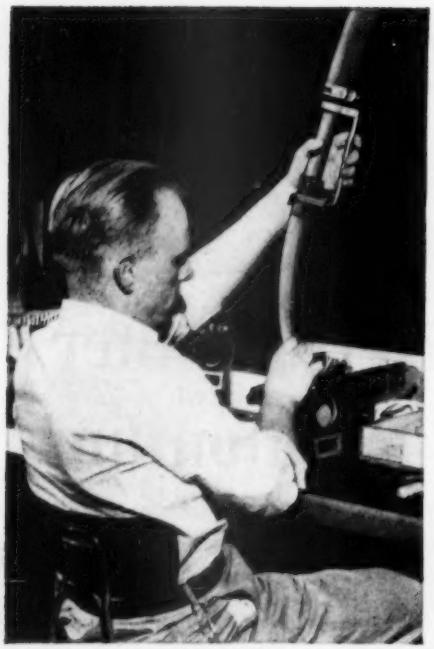
If you require the benefits of lower starting current, smoother acceleration, overload protection and shock absorption on the equipment you buy or use, specify American Blower Gyrol Fluid Drives.

For complete data, contact the nearest American Blower Branch Office conveniently located in principal cities.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS



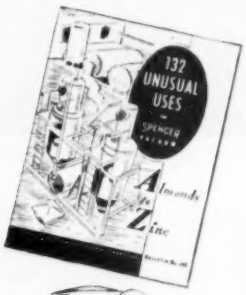
BENCH WORK with SPENCER VACUUM

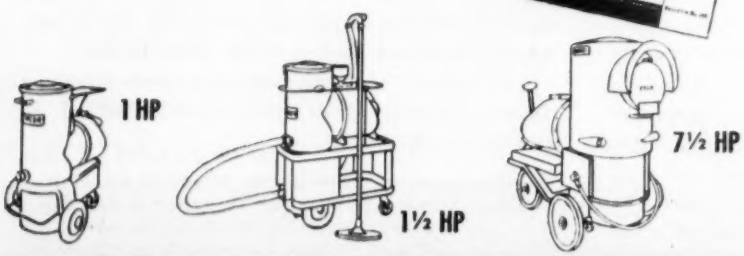
Bench work on delicate airplane instruments was speeded up by providing each worker with a special Spencer Vacuum tool with a hand valve as shown above. It is similar to the older method of providing a compressed air line for every bench except that all particles including the finest dust are collected in a container instead of being blown all over the room.

There are more than a hundred special uses for Spencer Vacuum in industrial plants. It will reclaim metals, pick up water, handle hot materials and even convey loose materials such as rice, chemical powders and foundry sand, by the ton.

Look over the 132 unusual uses for this new industrial tool, and remember that your plant housekeeping will be done better and faster, every night, with the same equipment.

Ask for Bulletin No. 144





THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

466-B

FIELD REPORTS

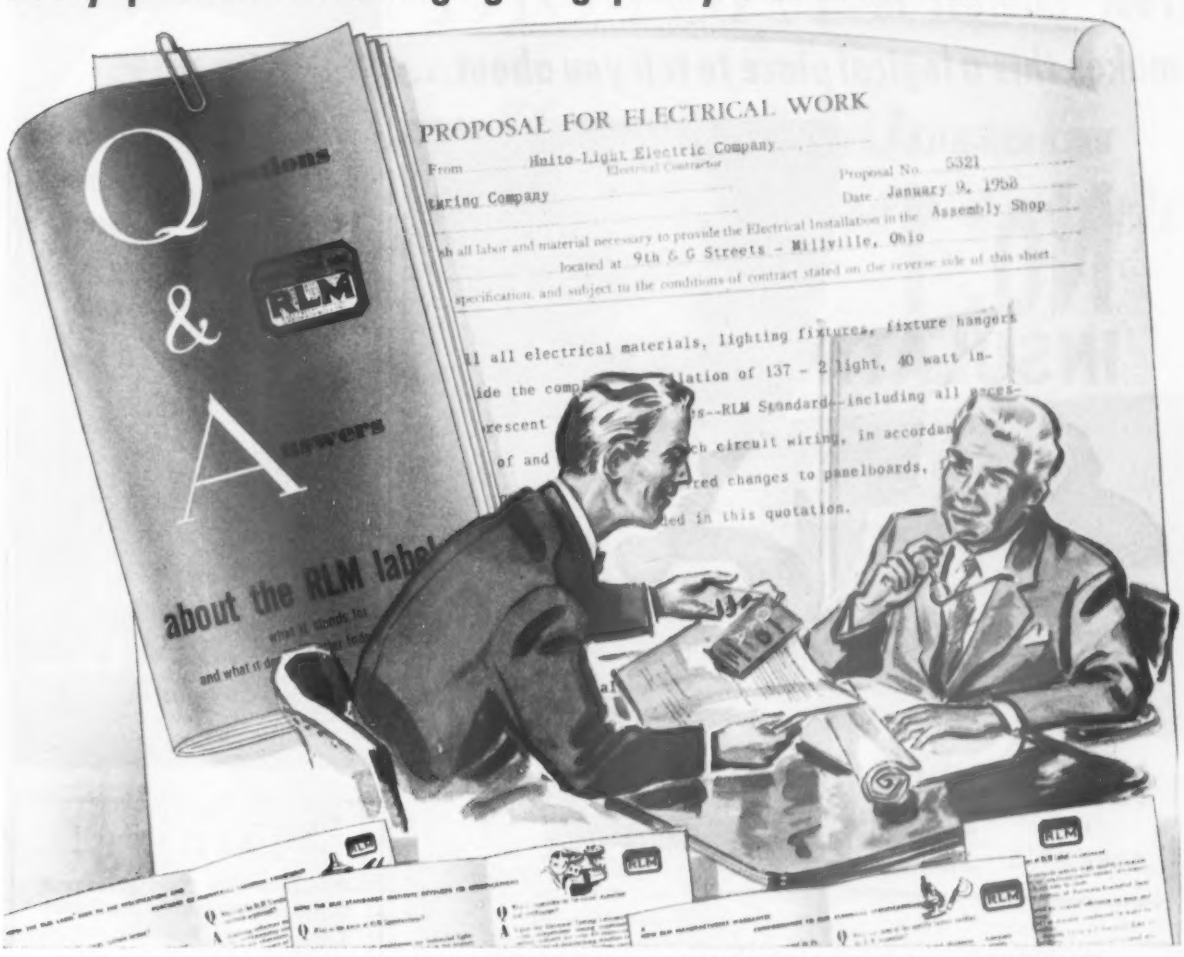
Begins on page B-141

ceiling. But, even with acoustical treatment on the ceiling and carpets on the floors, voices travel considerable distances. So G-O is recommending full partitions.

17. **Quicker construction to begin earning sooner.** By all means, clients are interested in this factor. That is where the so-called package organization shines. An integrated organization, offering architectural, engineering, and construction services gets plants up faster.
18. **More land for future expansion.** By all means. Industry is buying land now in great quantities anticipating future growth.
19. **Water supply.** Where water is important for processes, more plants are being located on river or lake cities. Plants do their own pumping ether to reservoirs or for immediate use. There are also a lot of large deep wells being driven as industry searches for good water sources.
20. **Space for higher percentage of white-collar people.** G-O is planning more space in engineering and accounting departments as a rule. The government with its numerous forms to fill in has boosted the need for space in the accounting departments. And the growing functions of engineering are requiring more space for more people.
21. **Protective coatings against corrosion or wear.** Rubber-based paints have proved excellent for general factory use as have the newer alkyd-resin paints. Vinyl paints will probably gain rapid acceptance. With them you can practically seal a building.
22. **Electronic aids.** They are being used more and more for heating and lighting controls. It is now possible to control general factory temperature to within half a degree with

Turn to page B-171

Every question concerning lighting quality is answered...



...when this new RLM QUESTIONS and ANSWERS BOOKLET is attached to the industrial lighting bid!

Industrial lighting bids submitted by progressive contractors have this new, pocket-size RLM Questions and Answers booklet attached to them. This is a valuable service to the buyer, because the booklet explains the importance of quality in lighting equipment and the meaning of the RLM Label on the units recommended by the bid. In eight pages, the booklet answers the buyer's most frequently-asked questions in regard to increased lighting efficiency, improved performance and longer life. It gives him sound, dollars-and-cents reasons why it pays in the long run to put out the slightly-higher price for lighting equipment which conforms to RLM Quality Standards.

To the seller, too, this booklet performs a valuable service. By promoting a keener understanding of the merits of quality lighting equipment, it helps build a sound business, based on good will and satisfied customers.

Whether you buy, sell or specify industrial lighting equipment, we'd like to send you a copy of the new RLM QUESTIONS and ANSWERS BOOKLET. Address request to: RLM STANDARDS INSTITUTE, Suite 829, 326 West Madison Street, Chicago 6, Illinois.

Copies are available for distribution in quantity, through the 28 leading manufacturers, who are members of the RLM Standards Institute. A list giving the names and addresses of these lighting equipment manufacturers will be sent to you upon request.

RLM ELECTRICAL TESTING LABORATORIES, INC.

RLM STANDARDS INSTITUTE INCORPORATED

The letters RLM stand for Reflector and Lighting Equipment Manufacturers

R192

Your interest in FACTORY makes this a logical place to tell you about...

BALDWIN-HILL

No. 1 INSULATING CEMENT

SEE OUR CATALOG IN SWEET'S

PLANT ENGINEERING FILE

or write for copy

Where you require a highly effective, plastic insulation to be applied easily and economically . . . B-H No. 1 CEMENT is your answer. It is particularly adaptable for insulating ducts, breechings, valves and piping not suited to molded types of insulation. Effective up to 1800°F., B-H No. 1 has exceptionally low thermal conductivity. It also provides an economical advantage in its reclaimability where temperatures have not exceeded 1200°F. It can be remixed with water and used again without loss of efficiency. And a rust inhibitor prevents corrosion of steel surfaces covered by B-H No. 1 CEMENT. For more complete information, get in touch with B-H Engineered Insulation Service—and send the coupon below.

Baldwin-Hill

Clip on signed letterhead and mail

TEAR OUT

BALDWIN-HILL COMPANY, 505 Breunig Ave., Trenton 2, N. J.

Please send complete information on

- ☐ No. 1 INSULATING CEMENT . . . All purpose, rust-inhibiting, plastic cement
- ☐ MONO-BLOCK . . . Rigid, felted rockwool block—for high and low temperature use
- ☐ POWERHOUSE CEMENT . . . High adhesion, rockwool, insulating-finishing cement
- ☐ BLANKETS . . . Metal reinforced, flexible, felted, rockwool insulation

The biggest "FAN CLUB" in America is made up of leading Heating and Ventilating Engineers who specify HERMAN NELSON PROPELLER FANS!

Send your "FAN MAIL" to:

American Air Filter
COMPANY, INC.
215 Central Avenue
Louisville 8, Kentucky

Warning!

Industrial skin accidents cause more lost time than broken bones

It just doesn't make sense to yell about safety in your plant and neglect occupational skin hazards from oils, acids and alkalis, which are among the most frequent and severe of all factory injuries. You're risking lost production, costly claims and good employee relations.

$147.00* — that's the average skin trouble treatment cost in some areas. If you've escaped it, you're lucky. And you know it doesn't pay to push your luck. It's real cost cutting to see that your people have protective clothing, especially gloves.

The complete line of 32 non-allergic PIONEER Stanzoil Gloves of oil-and-acid resistant DuPont neoprene are meeting every hand-skin hazard in hundreds of plants — at very low cost per hour. Don't take chances with dangerous occupational dermatitis — write *today* for new Stanzoil catalog that shows you how to choose the safe economical glove for each job!

* *"Industry's Big Itch", "Occupational Hazards", December 1952.*

Industrial Products Division
The PIONEER Rubber Co., 222 Tiffin Rd. Willard, O.
QUALITY GLOVES FOR 35 YEARS

If you think your paint jobs are tough

If you place the orders or approve the bills for jobs like this, you know how painting costs break down. And you know that the cost of even the best paint is only a small part of the total—nowhere near what it saves by adding extra years between repainting. That's why so much quality aluminum paint is used for jobs like this.

Because aluminum paint is the first choice for many industrial applications, special formulas have been developed. Paints made to these formulas last longer, cover better, stand up under corrosive industrial smoke and fumes.

If you have plants, structures or equipment that need paint, it will pay you to find out more about the kinds of aluminum paints now available. We do not make paint. But, as the leading suppliers of aluminum pigments to paint manufacturers, we want you to get the best results from the aluminum paint you buy.

Write us about your paint problems and we'll recommend the kind of paint to use. We'll also send you a copy of *Painting with Aluminum*. It is packed with facts and answers to all types of industrial painting questions. Write Paint Service Bureau, Aluminum Company of America, 1792-E Alcoa Building, Pittsburgh 19, Pennsylvania.

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

"SEE IT NOW" with Edward R. Murrow—CBS-TV every Sunday . . . brings the world to your armchair. Consult your newspaper for local time and channel.

It's EASY to Keep Your Floors FREE of SLIPPERY OIL SPOTS

with

Oil-Dri

TRADE MARK

ABSORBENTS

the modern, economical oil and grease absorbent that keeps your floors dry, clean and safe, and reduces maintenance costs.

A 60-SECOND DEMONSTRATION TELLS THE STORY!

MAIL THIS COUPON TODAY!

SOLD THROUGH AUTHORIZED WHOLESALERS

Oil-Dri Corporation of America

520 N. Michigan Ave. Chicago 11, Illinois

Name _____

Address _____

City _____ State _____

quick-acting controls now available. Also, where extensive controls are used in the processes, designers must provide space for them and services to them.

23. **Better grades of ceramic tile** are now available at reasonable cost. G-O is using a lot of ceramic bisque 4 inches thick. It is a load-bearing unit with a ceramic finish for interior walls.

Plant Services

1. **Better employee facilities** for up-graded work forces. This is one thing plant management will spend money for. There is increased interest in rooms for lounging, and equipped with television and radio. G-O is asked to provide better looking floors and finishes in general.
2. **Water supply and waste disposal.** Where the process requires it, pre-treating plants are installed. Because of laws regarding waste disposal now in effect, waste disposal plants will be essential where the effluent can pollute nearby water. Where possible, G-O tries to incorporate by-product reclaiming equipment in the disposal system.
3. **Better offices for down-the-line people.** Yes, this is a trend. And air conditioning is being provided, too. For example, foremen are usually in and out of their offices all day. So their offices should have the same temperature as the plant.
4. **Inter - communication.** G - O looks for more use of in-plant television in the future. There probably won't be any difficult design problems.
5. **Ease of connection** to utility service lines when machinery is moved. G-O provides for electrical connection to bus ducts in case of layout changes, and where the client requires it, other service

Turn the page

THE OSTER "WILCO" is fast and flexible

It threads a wide range of pipe without die-head change

MAINTENANCE threading can be a headache. You get a 4″ pipe, a 2″ bolt, a 6″ pipe . . . different sizes, different lengths. But there's a cure for maintenance threading headaches . . . the Oster "Wilco" . . . a machine that gives you speed and flexibility at a price that's easy-on-the-budget.

You can change pipe and bolt sizes in seconds with an Oster "Wilco" because just one die-head handles them all. You thread pieces as short as 8″ without a nipple chuck because the Oster "Wilco" Front Gripping Chuck is offset to take them. Regardless of the pipe or bolt size, the Oster "Wilco" threads and cuts off at the right speed because of its two speed motor. The Oster "Wilco" threads 4″ pipe in 56 seconds and cuts it off twice as fast; it threads 1″ pipe in 12 seconds.

The Oster "Wilco" is flexible, efficient, and fast. Its price is moderate . . . it's the one real answer to high quality, low cost maintenance threading.

OSTER

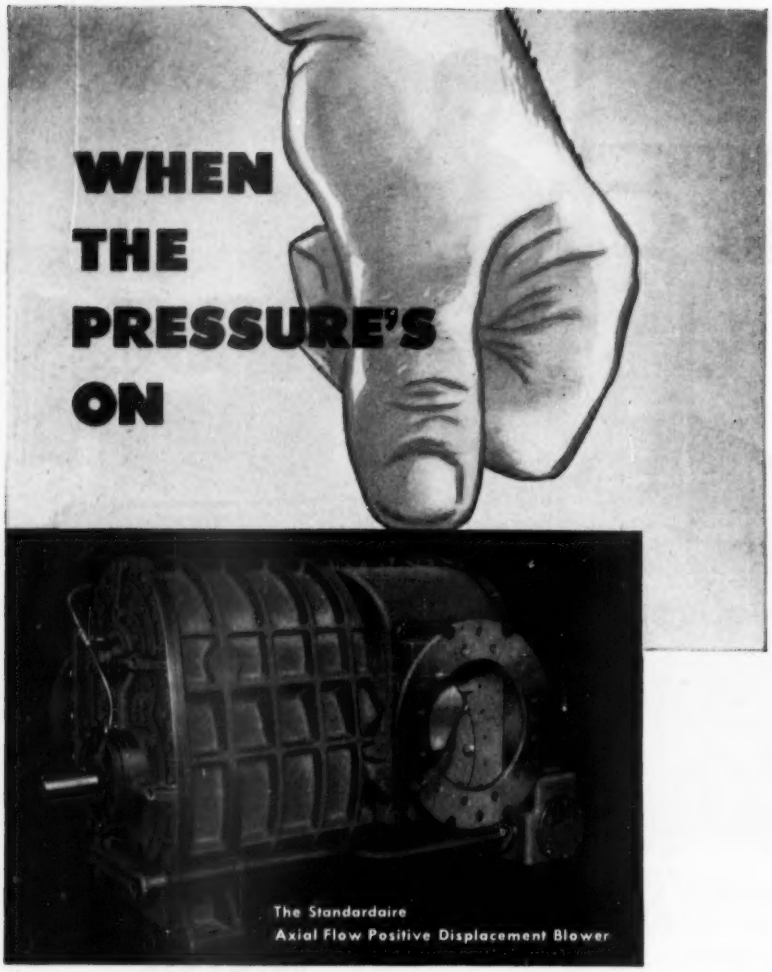
Your Oster Distributor can help you solve your pipe threading problems. He offers sound recommendations, speedy delivery, and dependable service . . . and he stands behind the products he sells. Contact him for money saving facts, or if you don't know who he is, write us for his name and address and a free factual, illustrated booklet about the Oster "Wilco".

THE OSTER MANUFACTURING CO.

Main Office and Factory:

2039 East 61st St., Cleveland 3, Ohio

1893 • CELEBRATING 60 Years Leadership in the Threading Industry • 1953



for increased air handling efficiency . . .

Consider a Standardaire Axial Flow Positive Displacement Blower *first*. Its unusual design features provide the greatest output per pound of weight ever achieved in this type of blower.

The Standardaire Blower employs an exclusive means of compression which provides a wide range of pressures with a minimum of internal losses. It can be operated at high speeds, permitting direct drive by favorably priced, standard motors in an efficient speed range.

Air is drawn in and discharged smoothly. Compression is gradual and free from the shocks which load internal parts and decrease efficiency.

These are but a few of the unique features of this compact unit which assure outstanding results. For further information, write . . .

CORPORATION

Begins on page B-144

grids can be incorporated in the design.

6. **Dust control.** There is a lot more use of dust control equipment for health reasons as well as reclaiming. But mostly for health. Laboratories within the plants often require pressurized rooms with positive exhaust to the outside.
7. **Air cooling.** Definitely growing in importance.

Materials Handling

1. **Gillmore-Olson has installed** several of the ABC Sealer Company's new automatic carton - making machines. These machines start with flat cartons, erect them, glue one side, and then seal the other side after goods are loaded.
2. **Aisle space and processing areas.** Definitely growing because of increased traffic in these aisles, both motorized and pedestrian.
3. **Aisle space and storage areas.** Growing. Buyers want goods delivered when they want them. Therefore the manufacturer must store until customer is ready for delivery.
4. **Provision of space for in-process inventories.** Also growing.
5. **Provision of conveyors** or other equipment to replace floor space. G-O has installed a lot of overhead conveyors as well as floor-mounted conveyors for this purpose.
6. **Provision of overhead equipment.** Yes, good design gets most plant service equipment off the floors.
7. **Floor load capacities.** Generally going up as heavier mobile equipment is introduced; as heavier manufacturing machines are developed; and as tiering heights are increased.
8. **Ceiling heights.** These are definitely being increased, too. Not too long ago, 13 feet was the average. Now it is close to 20 feet.

Expert INSPECTION AND RECOMMENDATION KEEPS MINOR DAMAGE FROM BECOMING MAJOR FAILURE...

Ability to keep roof maintenance costs low result from the Tremco Man's knowledge of roof conditions and experience in solving all kinds of roof problems. He *rescues roofs,* by spotting trouble sources before they become costly repair problems.

The Tremco Man:

(1) Inspects all roof areas—copings, flashings, parapets, projections—to locate danger points.

(2) Recommends methods and products for solving roof problems, and a planned program for preventing roof deterioration.

(3) Instructs your own maintenance men in economical, labor-saving methods, provides mechanized equipment, or recommends a reliable contractor.

You can obtain the Tremco Man's planned recommendations without obligation. Write today for the free 32 page booklet—"Solving Roof Problems."

EFFICIENT TREMCO MAN METHODS SPEED ROOF REPAIR

Recommendations by Tremco Man J. L. Ferguson and repairs by the contractor, John Russell Corp., rescued this roof at the plant of Tampax, Inc., Rutland, Vt. Repair of flashings and blisters was followed by a resaturation of the dried-out roof mat with Tremco Roof Preservative, delivered from the ground by the time-and-labor-saving Tremco Roof Pump. The pump is available on a low cost rental basis.

TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

* The Tremco Man can also help you solve problems involving floors, sash maintenance, water repellence and interior and exterior painting.

25 YEARS OF 1928 TREMCO 1953 KNOWING HOW

THE TREMCO MANUFACTURING COMPANY, Cleveland, Ohio and THE TREMCO MANUFACTURING COMPANY (Canada) LTD., Toronto, Ontario

Modernize any washroom . . . new or old with

SCOTT

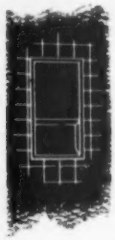
Recessed Fixtures

HERE are the units designed to keep step with today's growing trend to recess fixtures . . . three new stainless steel units that meet the most exacting demands for modern washrooms.

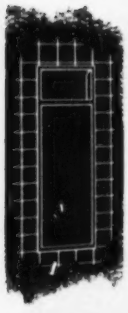
Make sure you build maximum efficiency . . . over-all attractiveness . . . all-important cleanliness into your washrooms—now and for the future—specify Scott-designed recessed fixtures.

And, for the towel service that *saves* more because it *does* more—specify ScotTissue Towels.

If you would like a personal, convincing demonstration of cost-cutting ScotTissue Towels or the help of tested plans and specific suggestions for improving your washrooms—just write us. Address: Washroom Advisory Service, Scott Paper Company, Chester, Pa.

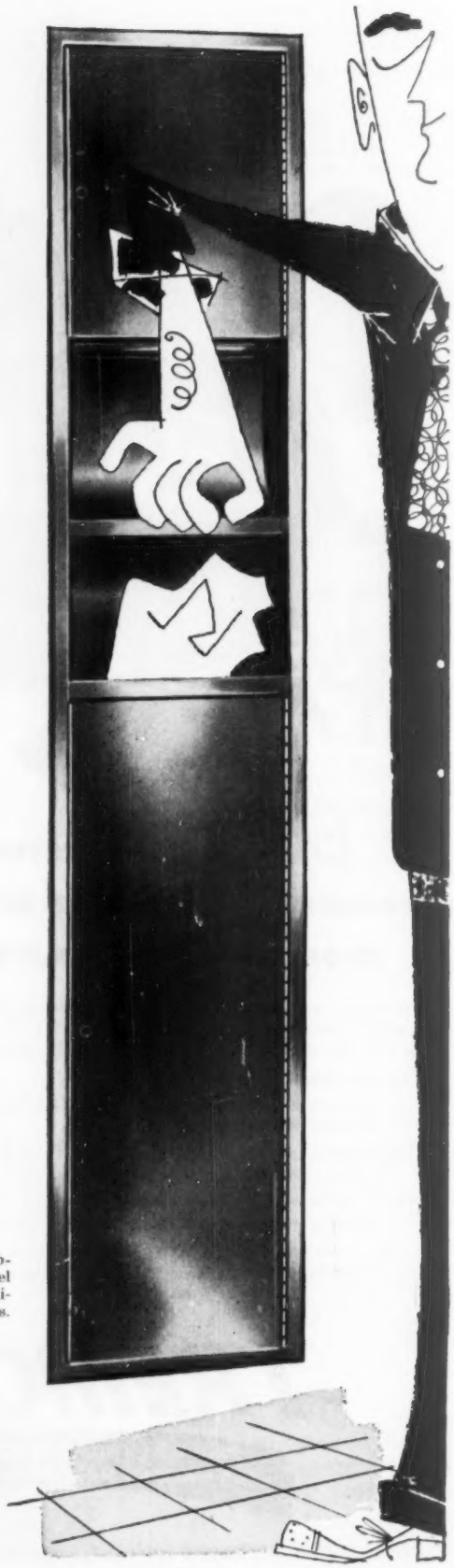


Scott No. 943 Recessed Towel Cabinet—Dispenses approximately 400 "C" type folded towels.



Scott No. 944 Recessed Waste Receptacle. Galvanized container.

Scott No. 945 Recessed Towel Cabinet and Waste Receptacle. Towel compartment dispenses approximately 400 "C" type folded towels.

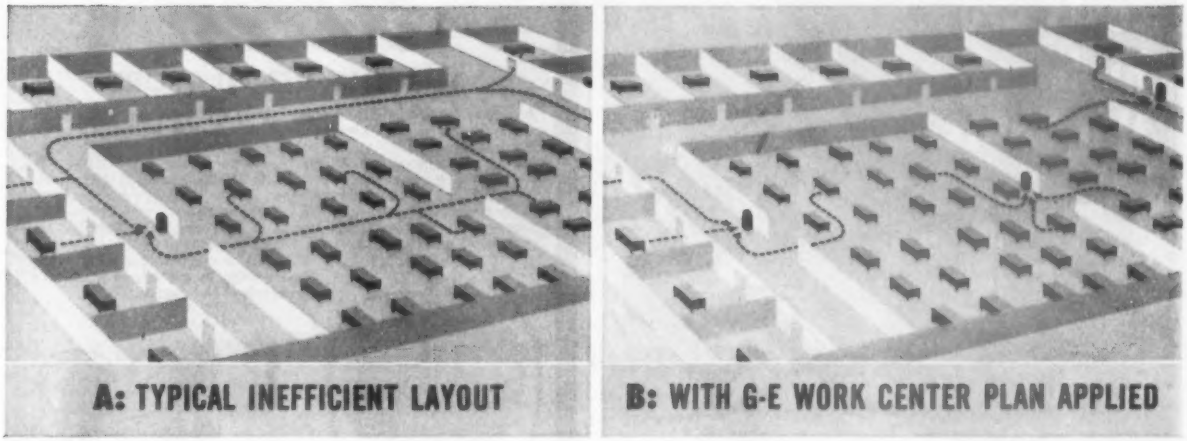


SCOTTISSUE TOWELS

Symbol of the right kind of washroom

"ScotTissue," "Washroom Advisory Service," Reg. U.S. Pat. Off.

G-E Work Center Plan applies science to water-cooler placement!



A: TYPICAL INEFFICIENT LAYOUT

B: WITH G-E WORK CENTER PLAN APPLIED

WATER COOLERS

can pay for themselves many times over

RULE OUT COSTLY PLANNING ERRORS! The first scientific study of water-cooler layout, made by General Electric last year, reveals costly misconceptions that creep into water-cooler placement in offices and plants. For example, it is often false economy to use one large cooler instead of two smaller ones!

TYPICAL LAYOUT OFTEN PROVES EXPENSIVE. Layout "A" requires the average worker to travel 130 feet to the nearest cooler. Figuring four round trips a day, 240 days a year, and 300 feet per minute walking-time, this means that each employee walks 47 *miles* a year that account for about 14 hours of lost time and, at $1.50 per hour average, nearly $21.00 worth of work the employer pays for but doesn't get.

MONEY-SAVING "WORK CENTER PLAN." In layout "B," the average distance to the cooler is 60 feet, comparable traveling time about 6½ hours, so you save 7½ hours, or $11.25 per employee. Multiply by 60 (number of employees) and the employer saves $675 a year—more than enough to pay for the added G-E Water Coolers *before the first year is out.* In five years, he saves a total of $3,375! And his investment is safeguarded for a full five years by G.E.'s generous Five-Year Protection Plan.

GENERAL ELECTRIC

HOW MUCH CAN YOU SAVE YOUR EMPLOYER with G-E Water Coolers and the G-E Work Center Plan?

Free study shows you annual payroll-dollars savings—in black and white! Also provides valuable, easy-to-use planning tools. Send in the coupon today. No obligation!

General Electric Company, Dept. FM-2
Air Conditioning Division, Bloomfield, New Jersey

Please send me the complete guide to efficient water-cooler placement.

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... COUNTY ..... STATE .....

When servicing costs are high as the lights...

LOWER BOTH LIGHTS AND COSTS WITH THOMPSON HANGERS

You're losing money when you use two men and a lift truck to service lighting fixtures . . . and you're risking someone's neck! THOMPSON disconnecting and lowering **HANGERS** facilitate rapid, safe, efficient floor-level maintenance of high-bay lights.

You can assure maximum round-the-clock lighting efficiency by following a planned maintenance program. And remember . . . *there is no faster, safer, or more economical means of servicing overhead lights than with THOMPSON HANGERS. Simple manual operation is exercised at floor level.*

10052 TE

Write today for new illustrated Bulletin TH52 for additional details.

THE THOMPSON ELECTRIC CO.

1121 POWER AVENUE • CLEVELAND 14, OHIO

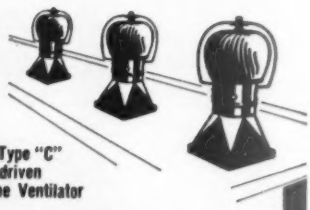
FOR TOP PERFORMANCE...

SPECIFY *Allen*

TURBINE VENTILATORS

Accurately rated, wind-driven Allen Turbine Ventilators are doing a noteworthy air-displacing job on commercial and industrial rooftops all over the country. Ruggedly built of prime sheets of heavy-gauge coated iron, (special, non-ferrous metals also available), these almost noiseless ventilators are in stock, ready for immediate delivery to you. Throat diameters, 6 to 48 inches. Economical to install and maintain, Allen Turbine Ventilators give maximum performance per dollar spent. Another type, motor-equipped Electro-Wind Turbine Ventilator, is available for use in areas where wind velocities are not always sufficient. Engineering assistance gladly furnished. Our representatives are in most principal cities; names listed in our catalog in Sweet's Architectural File, Section 20b.

Allen Type "C" Wind-driven Turbine Ventilator



Write for catalog on complete line of roof ventilators.

ALLEN ENGINEERED VENTILATION

PRODUCTION PLANNING CO.

ROCHESTER, MICHIGAN

Roof Ventilators for Every Commercial and Industrial Need

PORT-A-PONY

FEATHERWEIGHT PORTABLE

PIPE THREADER

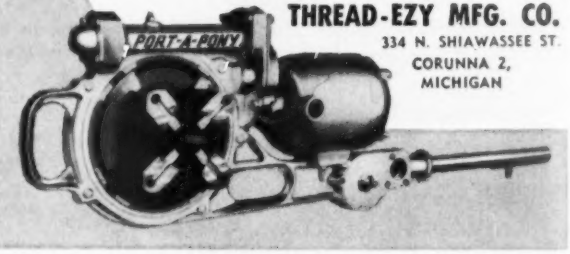
Here is a power pipe threader you can carry to the job in one hand. Weighing only 26 lbs., Port-A-Pony offers efficient pipe and conduit threading on all installation and maintenance work. You'll like the way Port-A-Pony threads any ¼" to 4" pipe on the job. The ½ hp reversible motor operates on 110V, AC or DC. Use your present die stocks.

Write for full information today.

THREAD-EZY MFG. CO.

334 N. SHIAWASSEE ST.

CORUNNA 2, MICHIGAN



INCREASED PRODUCTIVITY

MAY BE A MATTER OF "VISUAL APTITUDE"

The record of visual performance tests on more than 5,000,000 individuals, in 4,000 job categories, reveals that, regularly, four of every ten industrial workers are visually unqualified for satisfactory performance on the jobs they are doing. Furthermore, the record shows the high degree of responsibility on these visually-unqualified people, for high costs . . . waste and rejects . . . accident rate . . . labor turnover . . . training time and make-up pay.

YOU CAN IDENTIFY THE "VISUALLY UNQUALIFIED"

The Bausch & Lomb Occupational Vision Service is a scientific method for determining visual standards on the basis of job performance . . . for identifying those unsuited to their jobs . . . for visual rehabilitation and for placement in jobs for which visual aptitudes are advantageous.

A PROVED METHOD TO HELP YOUR PLANT MAKE MONEY 9 WAYS

1853/1953 INTO A NEW CENTURY OF OPTICAL PROGRESS
BAUSCH & LOMB CENTENNIAL

The Bausch & Lomb Occupational Vision Service is available to you. It is easy to administer. Employee participation is voluntary . . . *and workers like the program.* Benefits which accrue in plants using O.V.S. (benefits which can accrue in your plant, too) include:

1. Improved quality of production
2. Increased production per worker
3. Reduced waste of materials and work rejects
4. Improved accident record
5. Reduced labor turnover
6. Lowered training cost
7. More effective placement
8. Reduced absenteeism
9. Improved employee relations

MAIL TODAY!

Send for the brochure "Eyes Right for the Job," which tells what the Bausch & Lomb Occupational Vision Service is, how easily it can be administered in your plant, and at what low cost.

Bausch & Lomb Optical Co., 95217 Smith St., Rochester 2, N. Y.

Please send me the brochure "Eyes Right for the Job," and complete details on the Bausch & Lomb Occupational Vision Service.

Name..... Title.....
Company.....
Street.....
City..... Zone..... State.....

HERE'S HELP

for your engineer-recruitment problem

Engineers' Joint Council and The Advertising Council offer free, expert help to advertisers promoting engineering as a career.

The booklet reproduced here was prepared by The Advertising Council in cooperation with the Engineers' Joint Council to help you make your advertising work most effectively in recruiting engineers for the future.

1. It tells you what the problem is and the important part you can play in solving it.
2. It outlines the advantages of an engineering career to help your company develop advertising appeals.
3. It informs you as to the current activities of industry in the education and recruitment of engineers.
4. It offers specific suggestions as to what you can do (from present manpower).
5. It provides material that you can use in your own local and national programs.

Many advertisers are using this booklet today. They say that it helps in orienting their engineer-recruitment advertising to industry-wide recruitment programs.

Send for this Free campaign guide
Prepared by
THE ADVERTISING COUNCIL
for the
ENGINEERS' JOINT COUNCIL

JUST MAIL THIS COUPON!

The Advertising Council, Inc.
25 West 45 Street
New York 36, New York

Gentlemen: Please send me a *free* copy of *"How your company can help promote engineering as a career."*

NAME: .....

POSITION OR TITLE: .....

COMPANY: .....

ADDRESS: .....

INTRODUCING . . . the new member of the Dravo Space Heater family

DRAVO GAS-FIRED

Suspended Type

UNIT HEATER

—for heating and ventilating commercial and industrial buildings

—for process drying

Now . . . Dravo Corporation offers you the new Dravo Gas-Fired Unit Heater, ideal for installations requiring a heating output of 68,000 to 172,000 Btu. This new addition, joining the Dravo *Counterflo* Space Heater models, makes available a range of Dravo Heaters from 68,000 to 2,000,000 Btu.

ENGINEERED DESIGN

The Dravo Gas-Fired Unit Heater is ruggedly constructed with a cast iron heat exchanger, cast iron burners and a heavy-gauge steel exterior jacket with baked enamel finish . . . all designed for years of satisfactory service.

EASY INSTALLATION

The Dravo Gas-Fired Unit Heater is delivered completely assembled. Installation requires only hooking up gas connection and exhaust stack. Units are wall-hung or suspended from roof trusses to conserve valuable floor space.

DESIGNED FOR SAFETY

Dravo Gas-Fired Unit Heaters are approved by American Gas Association and listed by Underwriters' Laboratories, Inc. Safety pilot turns off gas automatically if the pilot light goes out or burns too low for perfect ignition. The cast iron heat exchanger and combustion chamber withstand corrosion and will not burn out.

EFFICIENT OPERATION

The Dravo Gas-Fired Unit Heater has a minimum heating efficiency of 80%. The draft hood prevents down drafts, absorbs all excessive chimney action and conserves heat. The heater delivers the exact amount of heat where you want it . . . when you want it. Automatic thermostat controls are available if desired.

AVAILABLE NOW

Units are available in a variety of sizes from 68,000 to 172,000 Btu, equipped with a fan or blower. Blower models are recommended for installations requiring heated air at greater velocity or against greater static pressure.

WRITE FOR INFORMATION

Get the complete details now describing the new Dravo Gas-Fired Unit Heater. Use the coupon.

DRAVO
CORPORATION

PITTSBURGH • ATLANTA • BOSTON • CHICAGO • CINCINNATI
CLEVELAND • DETROIT • INDIANAPOLIS • NEW YORK
ST. LOUIS • PHILADELPHIA • WASHINGTON

Sales Representatives in Principal Cities

Dravo Corporation, Heating Department
Fifth and Liberty Avenues, Pittsburgh 22, Penna.

☐ I want complete information on the new Dravo Gas-Fired Unit Heater. ☐ Please send me Bulletin No. OP54 -0

☐ Please have a representative call.

Name _____

Title _____

Company _____

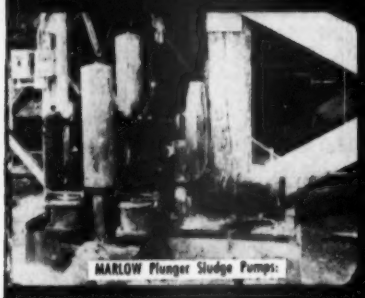
Address _____

City _____ Zone ____ State ____

ACTION
proves
MARLOW PUMPS

MARLOW Self-Priming Centrifugals:

MARLOW Diaphragm Pumps:


MARLOW Plunger Sludge Pumps:

MARLOW Horizontal, End Suction, Centrifugal Pumps:

are the BEST*

. . . for dependable, low-cost performance throughout industry!

Marlow Industrial Pumps are recognized as standard equipment for handling today's complex pumping problems. The Marlow industrial line is complete. Each pump is specifically designed for a particular function . . . they are job-engineered to meet specifications.

Marlows are recommended for efficiency and endorsed by industry for constant low-cost performance.

Modern Pumps for Modern Industry

MARLOW Self-Priming Centrifugals:
Automatic priming on suction lifts. Designed to handle a wide range of liquids with viscosities up to 500 S. S. U. Will not vapor lock. Close or long coupled, sizes 1½" to 10", 15 to 3,500 GPM, heads from 15 to 170 feet. Motors ¼ to 60 HP. Available for belt and gasoline engine drive.

MARLOW Diaphragm Pumps:
Built to take over the toughest kind of industrial pumping . . . for moving heavy, sluggish wastes. Gasoline, electric, or belt driven. Sizes 2, 3, and 4 inch single and 4 inch double. Capacities from 20 to 150 GPM.

MARLOW Plunger Sludge Pumps:
Rugged construction for long, hard use around-the-clock on the heaviest pumping assignments. Electric motor driven, operated with V-belt or roller chain drive. Sizes 4 to 8 inches. Capacities to 500 GPM. Special high-pressure models available.

MARLOW Horizontal, End Suction, Centrifugal Pumps:
Compact design for high-efficiency pumping of light liquids on flooded suctions. Close or long-coupled, sizes – 1" to 8". Capacity, 10 to 2,000 G.P.M. Motors ½ to 60 HP.

For more than a quarter of a century Marlow has been manufacturing pumps exclusively. When we say "Marlow means performance plus" it is based on facts and records.

Complete details available from your Marlow distributor 102

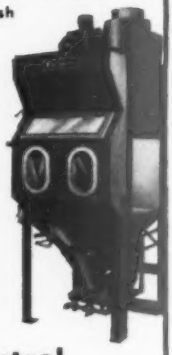
MARLOW PUMPS RIDGEWOOD, NEW JERSEY
Branch Plant: De Queen, Arkansas
Other factories in France and England. Distributors and Dealers everywhere.

HERE ARE 2 ANSWERS TO YOUR PRODUCTION PROBLEMS!

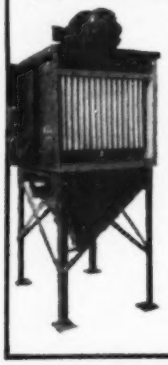
Pangborn cuts costs, saves time

(1) Precision Finishing

Pangborn Hydro-Finish Cabinet—Removes scale and directional grinding lines . . . holds tolerances to .0001" and prepares surfaces for painting or plating. Liquid blast reduces costly hand cleaning and finishing of molds, dies, tools, etc. Models from . . . **$1410** and up.



(2) Dust Control



Pangborn Unit Dust Collector—Traps dust at the source. Machine wear and tear is minimized, housekeeping and maintenance costs reduced. Solves many grinding and polishing nuisances and allows reclamation of valuable material. Models from . . . **$286** and up.

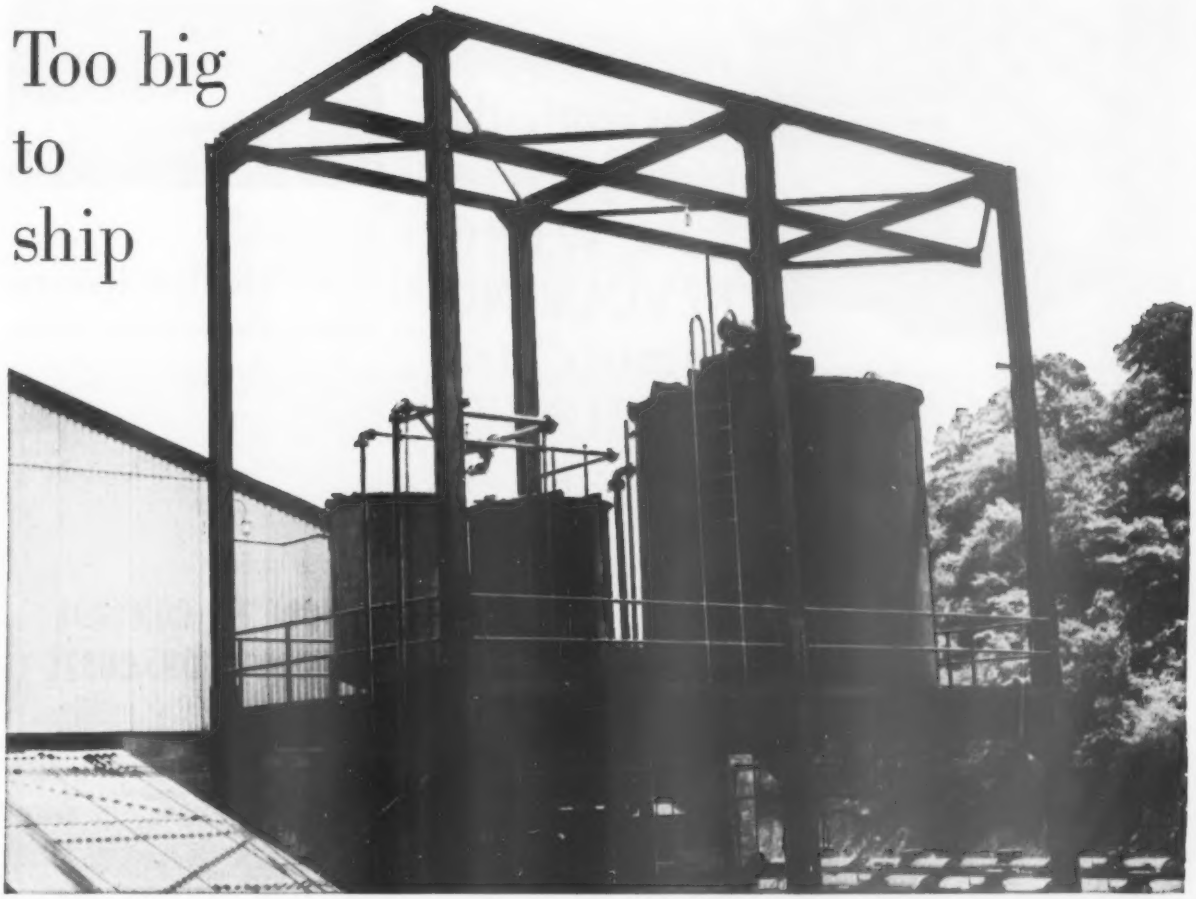
Pangborn Blast Cleaning Machines
Portable model cleans structures, bridges, tanks, quickly and economically . . . $187 and up. Stationary cabinet saves time and money cleaning small metal parts . . . $319 and up.

Write for details on these machines to: PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn
BLAST CLEANS CHEAPER
with the right equipment for every job

Too big to ship



so U.S. Permobond® protective linings were installed on the spot

EQUIPMENT requiring protection against corrosive attack can be lined with Permobond linings—*right in your own plant*. The above storage tanks in a chemical plant, for example, were too big to be shipped. So United States Rubber Company's Permobond Lining was installed and vulcanized right at the job site—insuring complete protection against the corrosive chemicals stored in the tanks.

This is one more example of the versatility and adaptability of the Permobond process. You can also have it installed *as original equipment* on anything that contains or conveys corrosive materials and chemicals—piping, tanks, valves. And where special conditions occur, a wide range of synthetic Permobond lining stocks is available. Write to the address below.

U.S. RUBBER
SERVING THROUGH SCIENCE

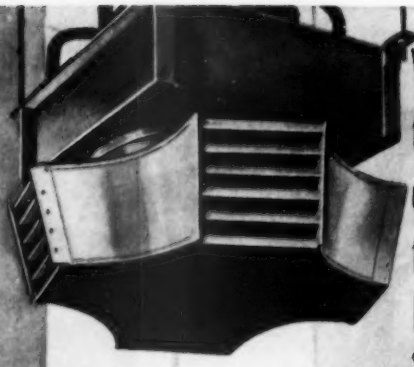
These hundreds of electrolytic mercury cells producing caustic soda and chlorine are lined with specially compounded Permobond hard rubber lining.

"U. S." Research perfects it..."U. S." Production builds it...U. S. Industry depends on it.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Products • Molded and Extruded Goods • Protective Linings and Coatings • Grinding Wheels • Packings • Tapes • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting



When Temperatures Soar!...the cooling breezes from WING REVOLVING "Heaters" feel WONDERFUL!

HERE'S how to keep workers happy, and production at peak all through the hot summer days. Just turn off the steam in your Wing Revolving Unit Heaters, and turn on the fans and revolving discharge outlets. **You will be amazed at the results!!**

Summer cooling, you know, is more a matter of air in motion than of reducing temperatures. Air in motion dries perspiration and a sensation of coolness results. The frequent changes in air motion (no steady blasts) from the Wing revolving outlets keep your workers pleasantly comfortable on the hottest days. Investigate Wing Revolving Heaters now for Summer Cooling—and for complete, uniform heating next winter.

Write for folder "How to Prepare for Summer Cooling"

Wing

L. J. Wing Mfg. Co.
162 Vreeland Mills Road
Linden, N. J.
Factories:
Linden, N. J. and Montreal, Can.

Rout the dollar losses

hiding behind poor cost control

Try the new conversion-cost method of finding and plugging leaks

There is only one realistic way to control costs and thus keep profits from sifting away, says this famous industrial engineer. He brings a thoroughly unique approach to the problem of cost, pricing, and profit in manufacturing. Since manufacturing is conversion of the material to the product, that is the cost that must be reckoned—the total conversion cost. In this book he fully explains the approach and describes the methods through which to plug cost leaks . . . know how to price each line . . . and develop effective methods of cutting costs and increasing production.

Just Published!

HOW TO CONTROL PRODUCTION COSTS

By Phil Carroll

Author of *Timestudy for Cost Control*
Timestudy Fundamentals for Foremen
How to Chart Timestudy Data

264 pages, 6 x 9, 76 illustrations, $5.00

This practical book is written for immediate in-the-plant use. Besides thoroughly explaining the total-conversion-cost method of control, it gives you every tool for putting that method to work immediately.

You start by throwing out old and unreliable systems—budgets that are unrealistic or overhead ratios that are more a drag than a guide.

Then you are shown how to set up the new conversion-cost system, by first setting up a realistic overhead—based on standard time—and finding standard material costs. Thus you can plot your expenses, find your variances, and price your products "right."

The action you must take to make this new system really effective is clearly outlined for you in the book. You'll see here how to make accurate sales forecasts . . . control production within accepted variances . . . get engineers to specify . . . set up effective employee incentives . . . get clear, prompt reports.

Packed with techniques to help you set up the new method:

How to set up **charts for plotting a curve of expenses.** There's only one sound way to do this, says this engineer-manager, and he tells you how to draw the curve, how to adjust the curve, how to read the curve.

How to find your **standard material costs,** and how to figure out the variances from these.

How to find the **leaks in cost control**—the variances—and how to call attention to them and act on them.

How to tell whether a **"special line"** is making money or costing money. Shows you hidden costs in a special operation.

How to use a basic rule to determine **how much stock** you should carry.

How to know **which kind of employee incentives**—profit-sharing, bonuses, individual incentives—really work in getting out more production.

——SEE THE BOOK TEN DAYS FREE——

McGraw-Hill Book Co., 330 W. 42 St., NYC 36

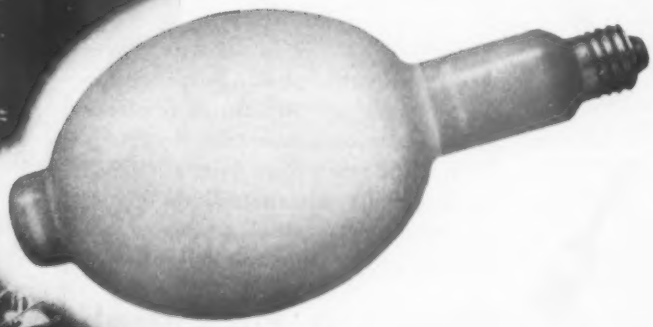
Send me Carroll's **HOW TO CONTROL PRODUCTION COSTS** for ten days' examination on approval. At the end of ten days I will remit $5.00, plus few cents for delivery, **or** return book postpaid. (We pay for delivery if you remit with this coupon; same return privilege.)

(Print)
Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position F-FAC-5

This offer applies to U.S. only.

32 Westinghouse Mercury Type Lamps replace 44 Incandescents —Give 7 Times More Light

BEFORE changing to the Mercury type lamps, John A. Roebling's Sons Corp. used 44 incandescent lamps to light their annealing plant.



AFTER changing to Westinghouse Fluorescent Mercury Lamps—the new design that gives white light—John A. Roebling's Sons needed only 32 lamps to light the same area. These 32 lamps gave 7 times as much light as the Incandescents.

When lighting factories, terminal buildings, parking lots, railroad yards and highways . . . Westinghouse Mercury type lamps are more efficient and economical. They produce more light per watt than Incandescents, and have a rated average life of 5000 to 6000 hours. As a result, you reduce total lighting costs. Since you use fewer, longer-lasting Mercury lamps your maintenance costs are cut to the bone.

WHERE YOU WANT WHITE LIGHT, you can use Westinghouse Fluorescent Mercury lamps. They produce white light with regular Mercury lamp economy and eliminate color-correcting Incandescents. *The newest size Westinghouse 1000-watt Fluorescent Mercury lamp is the cheapest source of mass white light in the world.*

The facts are in a 24-page booklet that is yours, free for the asking. Write to: Westinghouse Lamp Division, Dept FM-5, Bloomfield, New Jersey.

YOU CAN BE SURE...IF IT'S Westinghouse

CROSS-SECTION of Pittsburgh-developed feather-tip Neoceta bristle —showing molded-in grooves for superior paint carrying capacity.

Here's why Pittsburgh Red Stripe brushes can't be beat!

FOR SMOOTHER, neater, faster work, Pittsburgh Red Stripe brushes are your best bet! Red Stripe combines hogs' bristle with scientific Neoceta—Pittsburgh's new wonder-bristle designed specifically for painting. Both bristles wear at the same rate . . . your assurance of better performance and longer life!

Sash Brushes

Enamel & Varnish Brushes

Wall & Floor Brushes

Maintenance Brushes

There's a Pittsburgh brush for every home and industrial use!

For the address of the Pittsburgh supplier nearest you, write: PITTSBURGH PLATE GLASS COMPANY, *Brush Division*, Dept. F. 3221 Frederick Ave., Baltimore 29, Maryland.

FREE—the story of Neoceta—its development, its amazing characteristics. Write to the address shown above for your free copy of this interesting booklet.

PITTSBURGH

Red Stripe BRUSHES

BRUSHES • PAINTS • GLASS • CHEMICALS • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

"Special Coils for special heating or cooling problems"

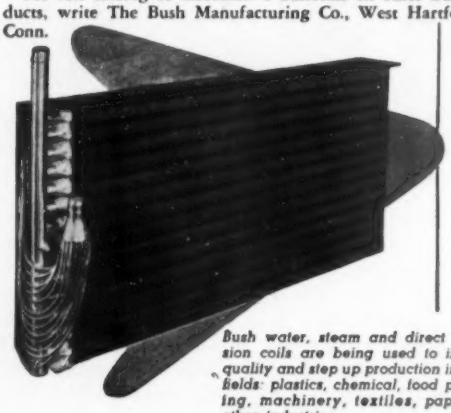
If you have a problem involving **heating, cooling** or dehumidification, join the many Plant Engineers who have used Bush coils to improve quality and increase production of their products.

Heat transfer equipment is specialized equipment. This is particularly true of finned coils. In their construction, careful consideration must be given to circuiting, tube size, fin size, header construction, ratio of prime to secondary surface, etc.

The Bush Manufacturing Co. has specialized in finned coil construction since the air conditioning industry was in its infancy.

Why not discuss your heat transfer problem with a capable Bush Sales Engineer? He'll be glad to recommend coils designed to meet your special operating or space requirements.

For coil catalog or informative bulletins on other Bush products, write The Bush Manufacturing Co., West Hartford 10, Conn.

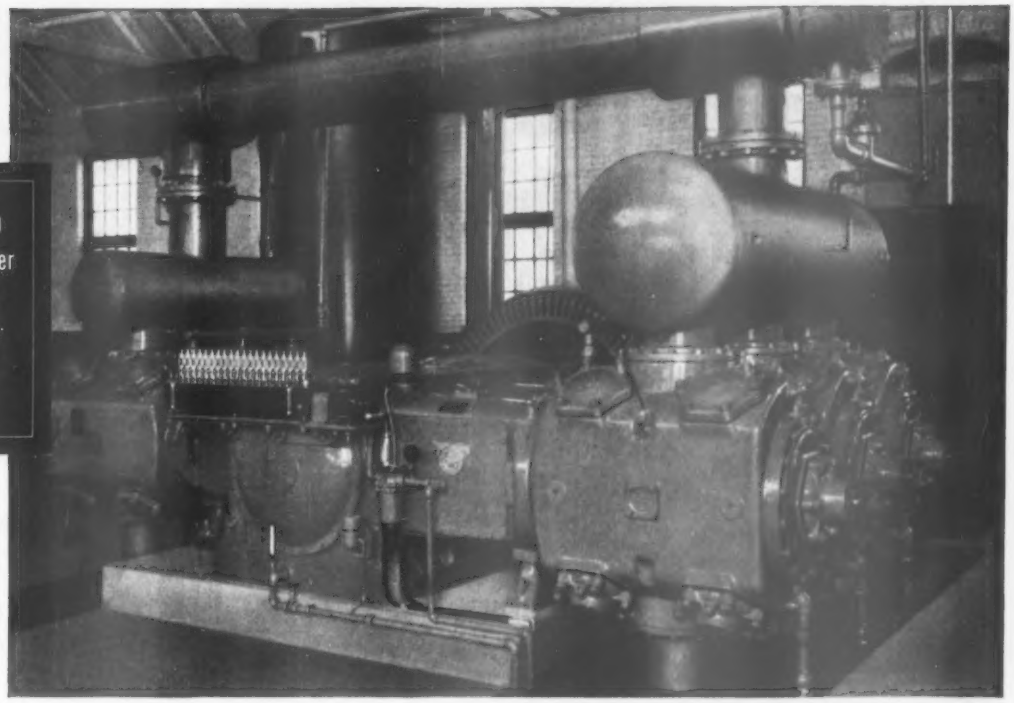


Bush water, steam and direct expansion coils are being used to improve quality and step up production in many fields: plastics, chemical, food processing, machinery, textiles, paper and other industries.

Bush Manufacturing Company

WEST HARTFORD 10, CONNECTICUT

Over 6 million Cooper-Bessemer Compressor Horsepower NOW IN USE!



Recently installed in Newark Stove Company plant, Newark, Ohio, this is a Cooper-Bessemer 800 hp Type FM compressor with 5 balanced-opposed compressor cylinders.

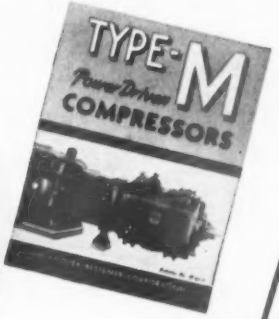
Why Air Costs Less at Newark Stove

Add up the advantages of this modern-type Cooper-Bessemer compressor, and you'll see why it does a *low*-cost job, year in, year out.

For example, with balanced, opposed action, it's the smoothest running compressor money can buy . . . and that means continuous, vibration-free operation with less repair, less maintenance.

For another thing, Cooper-Bessemer design offers unusual compactness. Foundation and piping requirements are correspondingly less. No need for a deep motor pit.

But check up further. Look into the many construction features, found only in Cooper-Bessemers, that are your *best* guarantee of permanent satisfaction.



SEND FOR THIS BULLETIN . . . it gives details and pertinent data on the Cooper-Bessemer power-driven Type M compressors. 350 to 1,000 bhp.

The Cooper-Bessemer Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington, D. C. Bradford, Pa. San Francisco Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle Tulsa Shreveport St. Louis Los Angeles Chicago Caracas, Venezuela Cooper-Bessemer of Canada, Ltd., Halifax, Nova Scotia Gloucester, Mass. New Orleans, La.

More and More Better Plants specify HOFFMAN for

Multistage Centrifugal BLOWERS and EXHAUSTERS

on applications like these

- AGITATION OF PLATING SOLUTIONS
- CONTINUOUS DRYING OPERATIONS
- ORE FLOTATION
- SEWAGE & INDUSTRIAL WASTE TREATMENT
- PNEUMATIC CONVEYING
- OXIDATION OF OIL & ASPHALT
- VACUUM CLEANING
- COMBUSTION
- GLASS BLOWING
- AIR SQUEEGEE FOR CONTINUOUS LIQUID REMOVAL
- RAW WATER ICE PLANTS
- PRODUCTION WASHING OF FOODS
- CIRCULATION OF LIQUIDS
- GAS BLOWERS AND BOOSTERS
- YARN DRYING
- WRAPPING, PACKING AND STACKING MACHINES
- EJECTION OF STAMPINGS FROM CONTINUOUS PUNCH MACHINES

IT'S A FACT! Hoffman Blowers often can effect a valuable saving on applications where high-cost compressed air was formerly considered necessary.

VACUUM CLEANING

to give "One Stroke" 100% Effective Dust Removal

Reduce plant maintenance and production costs throughout your plant. Four sizes of portable units, all built for heavy-duty industrial service. Stationary systems, with central collection and multi-sweeper capacity. A complete selection to provide the right size and type for most economical solution of your dust problem and to supplement present dust collection with 100% effective control.

***WRITE FOR BULLETINS** and your Free copy of a new 8-page booklet giving complete details on "Design Factors for Vacuum Cleaning and High Pressure Pneumatic Conveying Systems."*

AIR APPLIANCE DIVISION

U.S. HOFFMAN MACHINERY CORPORATION

102 E. 12th STREET, NEW YORK 3, N. Y.

CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO., LTD., NEWMARKET, ONT.

Derusto

PREVENTS RUST

Stops Rust

FOR NEW OR RUSTED METAL

EXTERIOR-INTERIOR

AVAILABLE IN STANDARD COLORS

For Pittsburgh Testing Laboratory Report and your nearest Distributor Write Dept. F.

MANUFACTURED BY

MASTER BRONZE POWDER COMPANY

5009 CALUMET AVE. HAMMOND, INDIANA

For a list of reprints of some of FACTORY's best recent articles on a variety of subjects on

•

Production

•

Maintenance

•

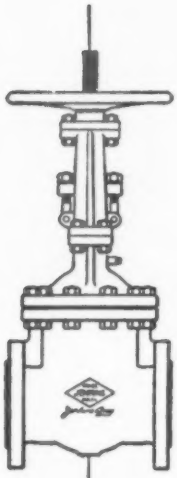
and Labor

•

SEE PAGE 199 PART ONE

A secure foundation

for future-minded builders



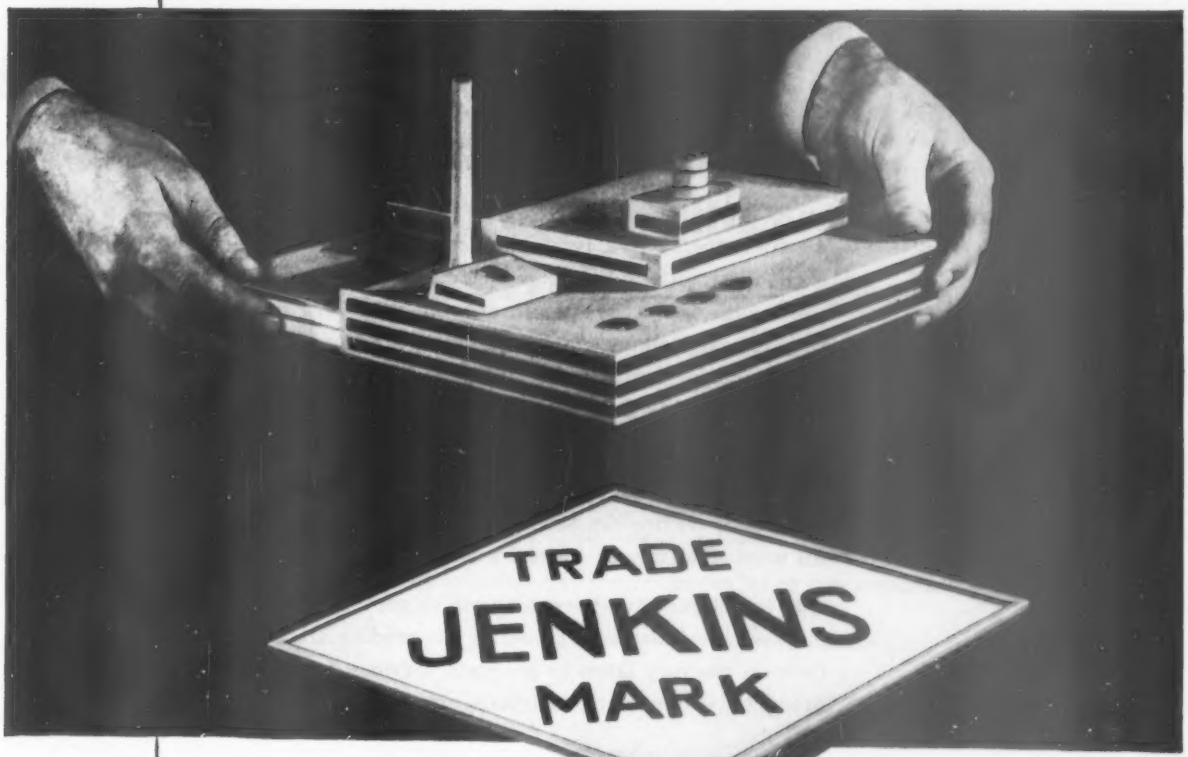
The famous Diamond and Signature trade mark on Jenkins Valves has merited the continuing trust of the nation's foremost builders since 1864.

On this symbol they know they can build with confidence that future, as well as present operating costs will be the lowest possible.

Jenkins builds *extra* endurance into valves . . . proved by low maintenance cost records in every type of service. Yet despite this extra value, *you pay no more* for Jenkins Valves. For new installations, for all replacements, let the Jenkins Diamond be your guide to lasting valve economy.
Jenkins Bros., 100 Park Ave., New York 17.

JENKINS VALVES

SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS



Jenkins Bros

How to keep informed on the "with what" part of your business

AT YOUR FINGER TIPS, issue after issue, is one of your richest veins of job information – advertising. You might call it the "with what" type – which dovetails the "how" of the editorial pages. Easy to read, talking your language, geared specifically to the betterment of your business, this is the kind of practical data which may well help you do a job quicker, better – save your company money.

Each advertiser is obviously doing his level best to give you helpful information. By showing, through the advertising pages, how his product or service can benefit *you* and *your* company, he is taking *his* most efficient way toward a sale.

Add up all the advertisers and you've got a gold mine of current, on-the-job information. Yours for the reading are a wealth of data and facts on the very latest in products, services, tools . . . product developments, materials, processes, methods.

You, too, have a big stake in the advertising pages. Read them regularly, carefully to keep job-informed on the "with what" part of your business.

McGRAW-HILL FOR BUSINESS

McGRAW-HILL PUBLICATIONS

You can't stop a flood with a sieve

You can't stop corrosion with ordinary paints ... it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings. They can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic Coatings can!

FIRST—Unlike maintenance paints, Bitumastic® Protective Coatings are specially formulated from a coal-tar pitch base* that is, for all practical purposes, impervious to water. When you keep moisture away from an exposed surface, you *stop* corrosion.

SECOND—Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable. These coatings provide up to 8 times the film thickness of conventional paint coatings.

**Hi-Heat Gray contains a vehicle with metallic pigment.*

THIRD—Bitumastic Coatings stop corrosion caused by moisture — acid fumes—alkaline fumes—salt air—heat.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information, or see our catalog in Sweet's Plant Engineering File.

SEND FOR SET OF FREE BOOKLETS!

Koppers Company, Inc., Tar Products Division
Dept. 553-T, Pittsburgh 19, Pa.

Please send me, without charge or obligation, complete information on corrosion prevention.

Name .....

Address .....

City ..... Zone ..... State .....

KOPPERS BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 553-T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

For maximum "see-ability"... better work...increased production...

LUSTRA JADE-LITE

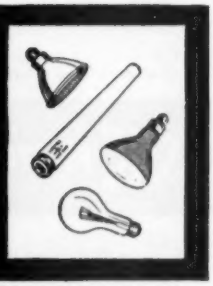
HERE'S THE ONE AND ONLY fluorescent tube that has ever been designed for super-service in critical work areas. Lustra Jade-Lite gives a special quality of light that steps up "see-ability". In addition, its unique tone, in the blue-green spectral range, reduces glare, helps eliminate eye-strain, and results in a better quality of work and increased production.

From end to end, Lustra Jade-Lite *Double Duty* Fluorescent Tubes maintain their full light output during the whole of their extra-long-burning lives. Wherever they have been tried . . . in factories, shops, laboratories, drafting rooms, accounting offices, etc. . . . Jade-Lites have been immediately adopted as infinitely more efficient and economical.

Have your local Lustra Man demonstrate the amazing efficiency of the new Jade-Lite tube under your actual working conditions. What's more, he can solve practically any lighting problem with the complete line of Lustra *Double Duty* Lamps, Fluorescent Tubes and allied electrical products. **Write us for the full Lustra story. Lustra Corporation, Dept. T-5, 36 Washington St., Brooklyn 1, N. Y.**

Lustra

AMERICA'S DATED LAMPS



DOUBLE DUTY REFLECTOR LAMPS, INCANDESCENT LAMPS, FLUORESCENT TUBES, SPOTLITES AND FLOODLITES, RUGGED DUTY LAMPS, FLUORESCENT FIXTURES AND STARTERS

INDUSTRIAL TRAFFIC MANAGEMENT

Just Published!

How to cut down on transportation and shipping costs by modern traffic management. Details the job of the traffic manager, his problems, his tools. Discusses rate and freight classifications, covers shipper's rights. Discusses the bill of lading, routing, claims, tariffs, car service, transportation law. By **Thurman W. Van Metre**, Prof. Emer. of Trans., Grad. Sch. of Bus., Columbia U. 552 pp., $6.50

MATERIALS HANDLING

Just Published!

A complete guide to faster, more economically balanced handling of materials. Covers special handling problems—machine operation, warehousing, assembly, cargo equipment, railroad and truck handling, ship and barge handling, handling bulk materials. Discusses latest packaging, research and analysis, motion and time study. By **John R. Immer**, Prof. of Ind. Man., American U. 571 pp., more than 500 illus., $8.00

PSYCHOLOGY OF INDUSTRIAL RELATIONS

Just Published!

Presents industrial psychology in completely nontechnical terms. Covers motivation and discontent in industry, placement, helping people learn, getting work done. Treats grievances, personal problems, making work easier, establishing fair rates. Covers relations between employees and with unions. By **C. H. Lawshe**, Prof. of Psych., Purdue U. 339 pp., 26 illus., $5.50.

ENGINEERING MANUFACTURING METHODS

Just Published!

A definite engineering approach to modern manufacturing methods. Covers in detail classic and new methods of foundry, machining, and welding, to help you select the best process. Also discusses hot shaping, cold shaping, thermal treatment, and engineering materials. Considers cost as an important factor. By **Gilbert S. Schaller**, Prof. of Mech. Eng., U. of Wash. 613 pp., 423 illus., $7.00

SEE THESE BOOKS 10 DAYS FREE

McGraw-Hill Book Co., 330 W. 42 St., NYC 36

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep, plus few cents delivery, and return unwanted book(s) postpaid. (We pay for delivery if you remit with this coupon, same return privilege.)

- ☐ Van Metre—**Industrial Traffic Management**—$6.50
- ☐ Immer—**Materials Handling**—$8.00
- ☐ Lawshe—**Psych. of Industrial Relations**—$5.50
- ☐ Schaller—**Engineering Manufacturing Methods**—$7.00

(Print)
Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position F-FAC-5

(This offer applies to U.S. only)

STOP CORROSION

as

CALCO CHEMICAL DIVISION
AMERICAN CYANAMID CO.
did . . .

WITH A 3M CORROSION-RESISTANT COATING!

INVESTIGATE
3M COATINGS FOR

Abrasion Resistance

•

Non-Slip Surfacing

•

Sour Crude Resistance

•

Chemical
Fumes and Spillage

•

Structural Steel Protection

•

Maritime Uses

The Gloucester, N. J. plant of the Calco Chemical Division, American Cyanamid Company was experiencing severe damage to storage tanks from the spillage and fumes of corrosive chemicals. 3M advised Calco to apply EC-1034, a tough, long-lasting coating, especially effective against severe corrosion and abrasion. Today Calco finds that exposure to chemical corrosion—plus severe weathering as well—has little effect on these coated surfaces.

EC-1034 is only one of many 3M coatings designed to stop corrosion of varying kinds. Whatever *your* particular corrosion problem, let 3M help you find the best answer to it. Contact your 3M salesman today. For more information on 3M coatings, write 3M, Dept. 35, 411 Piquette Avenue, Detroit 2, Michigan.

3M COMPANY

ADHESIVES • COATINGS • SEALERS

MINNESOTA MINING AND MANUFACTURING COMPANY • ADHESIVES AND COATINGS DIVISION
411 PIQUETTE AVE., DETROIT 2, MICHIGAN
GENERAL SALES OFFICES: ST. PAUL 6, MINN. • EXPORT: 122 E. 42 ST., N. Y. 17, N.Y. • CANADA: LONDON, ONT.

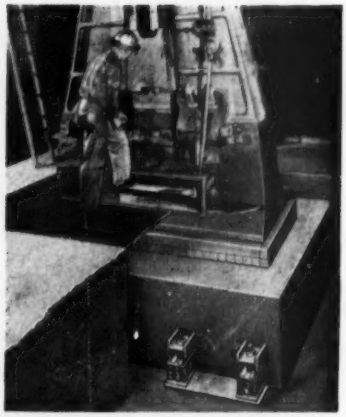
MAKERS OF "SCOTCH" BRAND PRESSURE-SENSITIVE ADHESIVE TAPES • "SCOTCH" BRAND SOUND RECORDING TAPE • "SCOTCHLITE" BRAND REFLECTIVE SHEETINGS • "3M" ABRASIVE PAPER AND CLOTH • "3M" ADHESIVES AND COATINGS • "3M" ROOFING GRANULES • "3M" CHEMICALS

For a "Better Plant"...

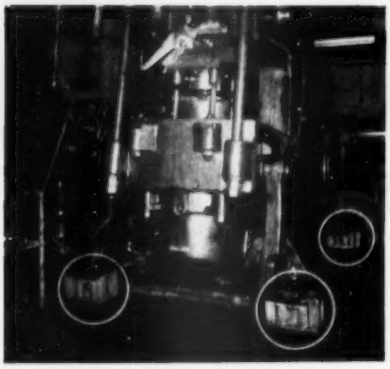
STOP VIBRATION WITH KORFUND VIBRATION CONTROL

Reducing transmitted vibration and dynamic loads with Korfund Vibration Control gives:

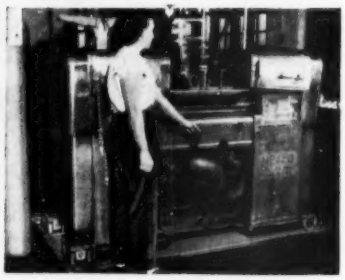
- More efficient plant layout
- Elimination of special foundations for most machines
- Reduced rejects—improved work quality
- Increased production
- Reduced maintenance
- Reduced noise and employee fatigue



Typical spring-isolated hammer foundation. Shock isolation is so complete that a coin will remain standing on edge beside the foundation as maximum blows are struck. Tests prove there is actually a slight increase in hammer blow efficiency.



Korfund Vibro-Isolators solved a serious vibration problem, and permitted installation of this 100 ton press on a weak upper floor in a loft building. Isolators often permit higher press speeds for greater production.



Today's precision machine tools pay off in high production to close tolerances when protected from external disturbances. Special foundations can often be eliminated with economical vibration control.

Vibration and shock transmission can be stopped at the source by mounting impact machinery such as hammers and punch presses, and mechanical equipment such as pumps and compressors on Korfund Vibro-Isolators. Accuracy of precision machines such as grinders, boromatics and jig borers can be protected against external vibration with Korfund machine tool mountings. Furnace arch and globar life can be more than doubled with protective Korfund furnace mountings.

Installation is simplified by means of Korfund Vibration Control for most machines because they can be installed on ordinary floors without special foundations. Furthermore, better equipment layout gives straight-line work flow for higher production.

Standard Korfund Isolators are available for most applications. A Selector Chart in bulletin G-105 gives recommendations for both normal and critical conditions, for hammers, machine tools, pumps, compressors, fans and most other mechanical equipment. See Sweet's Catalog Files or write us for Bulletin No. 4.

We'll gladly submit recommendations without obligation. Just contact us, or the Korfund representative you will find in most principal cities. A half century of experience is at your disposal.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

THE KORFUND COMPANY, INC.

48-35C Thirty-Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

B-196

The 1952 INDEX to FACTORY

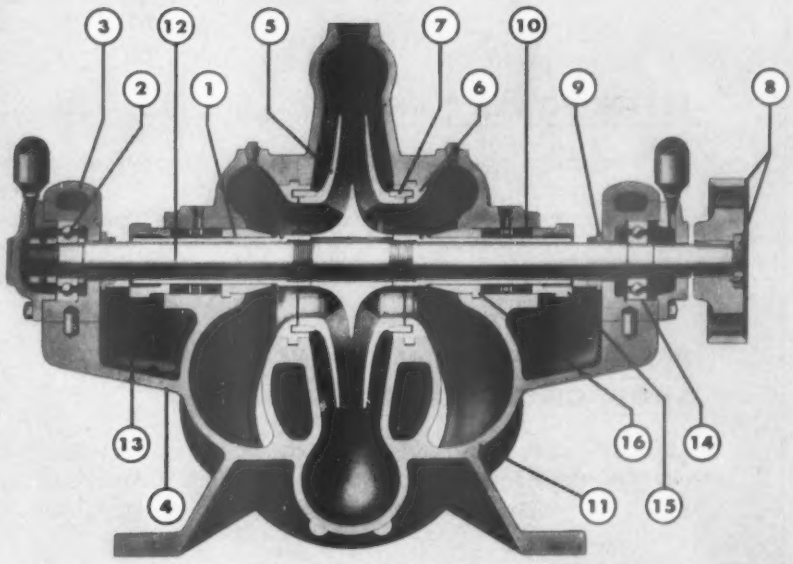
is now ready

FREE WHILE THEY LAST

... a complete guide to FACTORY'S editorial contents for 1952. Write the editor today for your free copy.

DE LAVAL
SINGLE STAGE CENTRIFUGAL PUMPS

for dependable industrial service



Labyrinth wearing rings minimize leakage...maintain high efficiencies

Labyrinth rings used in these De Laval pumps retard flow of water through labyrinth passage.

Flat rings showing relatively unimpeded flow of water.

① **Shaft Sleeves** are screwed on, to abut the impeller and make a water-tight joint. Sleeve expands freely and independently of shaft when temperatures change. There is no tendency to buckle.

② **Thrust Bearing** locates rotor axially.

③ **Bearing Caps** easily removable for maintenance.

④ **Bearing Brackets** scraped to lining bars for perfect alignment.

⑤ **Impeller** hydraulically balanced, finished on all surfaces.

⑥ **Labyrinth Wearing Rings** held accurately in machined grooves in both case and cover.

⑦ **Impeller Wearing Rings** threaded on impeller, opposite to rotation.

⑧ **Flexible Coupling** ground on all exposed surfaces and statically balanced, complete coupling supplied, pump half mounted on taper so that it can be easily removed. Check nut locks coupling on taper.

⑨ **Deflector** keeps water out of bearing.

⑩ **Stuffing Boxes** extra deep; lantern rings for water sealing.

⑪ **Pump Case** horizontally split; machined to limit gages.

⑫ **Steel Shaft** ground to limit gages.

⑬ **Drip Boxes** large; provided with drain openings.

⑭ **Radial Bearing** free to move axially, thus avoiding temperature strains.

⑮ **Glands** split horizontally.

⑯ **Protecting Bushings** renewable.

You can count on the performance of the De Laval Single Stage Centrifugal Pumps because they are precision-made to high manufacturing standards and incorporate the many quality design features shown in the cross-section.

They operate at high or low speeds, at high or low heads...with maximum efficiency.

For example, De Laval G, I and K Single Stage Double Suction Pumps have a capacity range of 175 gpm to 6,000 gpm, and heads to 300 feet. They are available in sizes ranging from 4" suction and 3" discharge to 14" suction and 12" discharge. Write for Bulletin 1002.

DeLaval also furnishes larger centrifugals for capacities up to 70,000 gpm. Bulletin 83-29R sent on request.

DE LAVAL *Centrifugal Pumps*

DE LAVAL STEAM TURBINE COMPANY

804 Nottingham Way, Trenton 2, New Jersey

DL 199

BETTER PLANTS for today's... and tomorrow's... needs

A report on Trends in...

Electrical

By J. W. ST. ANDRE • Electrical Editor, FACTORY

BETTER POWER PLANNING

More pre-planning of power service. Power supply at higher voltages because of (1) increased demand and (2) erection of plants in fringe areas. Larger capital expenditure by plant owners for incoming substations at new plants. Provision made for later expansion of these substations. *Page B-200.*

BETTER PROTECTION AGAINST SHORT-CIRCUIT CURRENTS

More attention to protection against short-circuit currents because of heavy amounts of power available in the circuits of the plants themselves and the public utility systems. *Page B-202.*

HIGHER VOLTAGES IN THE PLANT

Voltages for in-plant distribution are going up because of (1) increased load concentrations and (2) greater distances of transmission in large one-story plant areas. How to select the right voltages. *Page B-203.*

MORE UNIT SUBSTATIONS

Use of unit substations in new plants to service centers of electrical loads is growing. Locations improved. *Page B-205.*

MORE FLEXIBLE CIRCUIT ARRANGEMENTS

Circuit arrangements for in-plant distribution are being designed to give more flexibility and reliability of power service. Advantages of three basic types explained. *Page B-208.*

Distribution

BETTER CONDUCTORS

Newer types of conductors are giving economies in installation, maintenance, and system-expansion. More conductors going overhead. *Page B-211.*

BETTER CONTROLS

Motor controls are being concentrated into switchgear centers for easier maintenance, greater safety, and more flexibility to handle changes in manufacturing processes. *Page B-212.*

COMBINED POWER AND LIGHTING CIRCUITS

Growing number of new plants combining power and lighting distribution systems because (1) lighting loads are growing and (2) fluorescent and mercury lamps permit the economies of higher lighting voltages. *Page B-212.*

MORE USE OF D-C POWER

Need for easier adjustment of motor speeds for complex process equipment is causing an increase in use of d-c power. Better sources of d-c power available. Higher d-c voltages coming into use. *Page B-213.*

DESIGN FOR OPERATING ECONOMIES

New-plant builders are designing distribution systems to hold down power bills. Some features: greater use of instruments; use of modules or units in power and lighting distribution; more control over power factor and demand. *Page B-214.*

THE BIG FACT in power distribution in industrial plants is that the amount of power to be handled is growing rapidly. It's been doubling every 10 years, and there's no indication of any slackening in this growth rate. Quite the reverse. Ralph Cordiner, president of General Electric, predicts: "More electrical equipment will be built and installed in the next 10 years than in all of the past 74 years."

Particularly in the better new plants, management is paying more attention to power distribution. The system usually costs less than 10% of a new plant building. Many plants in the past have skimped on the power system. But the trend is the other way. Managements are finding that for an additional 1% they can get a power distribution system that is reliable, safe, economical to operate, and easy to expand.

TURN THE PAGE for more on trends ▶

SIGNIFICANT PLANT of 1952-53
Lone Star Cement Corporation ... page B-216 ▶

QUICK IDEAS For Better Electrical Distribution ... page B-222 ▶

NEW CATALOGS ... page B-266 ▶

Begins on page B-198

10 Trends in...
Electrical Distribution

1. Better Power Planning

Much heavier power usage is requiring more planning, better engineering, and higher voltages to get a good power supply for new plants. Where are you going to get the necessary electric power to operate your plant? For most factories, the answer will be simple: *from the nearest power company.*

When to Make Your Own Power

In some plants, however, management may be toying with the idea of generating its own power. The main question here is whether a lot of steam is required in the manufacturing process. In that case, electric power becomes a byproduct of the steam plant. Chemical plants, refineries, textile mills, steel plants, paper mills, are all examples of plants that often pay off in generating their own electric power.

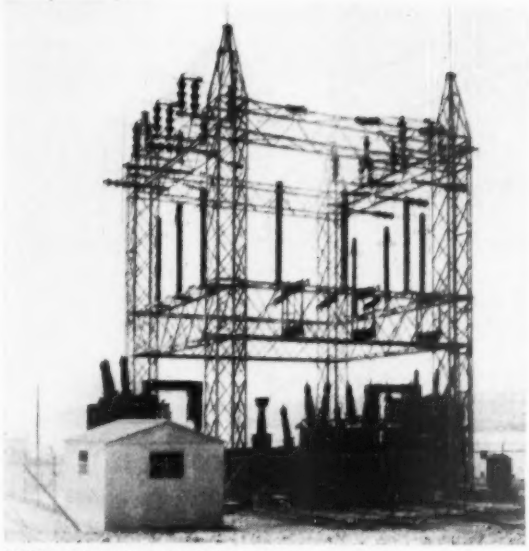
Another factor that will immediately put you in the generating business is the lack of power—either completely or in the amounts you need. There are still locations in this country where such conditions prevail.

But, even in remote locations, utility company service can frequently be worked out. One company building a defense plant was able to work out an agreement with the power company by which the transmission lines were purchased by the plant. The cost was prorated over 5 years and discounted in the power bill so that the plant could get its money back for the purchase of the lines if it used the amount of power contracted for. The alternative would have been to put in a generating plant with plenty of reserve capacity for stand-by duty during maintenance periods or in case of trouble.

If You Buy Power

Smart new-plant managements that are going to purchase power will consider many factors in dealing with the power company. Some of them will have a great deal to do with the original plant cost. They may even affect the cost of manufacturing.

First step is to bring the power company into the picture at the earliest possible moment. The power company may have only a limited amount of power available where you propose to locate. New feeder lines may have to be run out for miles from the utility's nearest switching station. You may have to pay for all or part of the cost of those lines.



HIGH-VOLTAGE SUBSTATION for handling 7500-kva. plant load at 110,000-volt service from the power company.

Sometimes the difference in cost of bringing power service to the new plant site may be the deciding factor in picking the site. Even though there is a power line running along the road on one side of the plant site, that's no reason to believe that your power problems are solved. The line may be already fully loaded or have insufficient capacity to take care of your needs.

For example · Last summer a manufacturer approached E. A. Armstrong, manager of power sales for the Commonwealth Edison Company of Chicago, to arrange for electric service for a new plant. There was a choice of three locations. The site tentatively selected was in suburban Chicago. The land cost was about $1000 an acre for 5 acres, or about $5000. The plant was to have steel melting processes with a demand load of 10,000 kw., and there wasn't sufficient electric power available. This necessitated running a long transmission line to service this one load, with no prospect of any other load revenue from the line. The cost of lines to obtain such service would have been over $50,000—this cost to be borne by the manufacturer.

The manufacturer told the power company about one of the other suitable sites—where land was more expensive. In this location there was more than 20,000 kw. available—and it would cost the manufacturer nothing for a power-line installation.

By paying twice as much for the property, or $10,000, he was able to save the $50,000 line cost.

Another reason for approaching the power company in the early stages of planning is to enable it to provide the facilities in time for your needs. Even if the power company agrees to furnish the additional facilities with no cost to you, it still is faced with the problem of getting the equipment. This sometimes means getting decisions from the public utility commission. Much engineering has to be done on the system. Sometimes it takes 12 to 36 months to get the equipment.

The Power Company Needs to Know . . .

How much power demand will you require? When you buy power, the power company must know not only *how much* power you are going to use but also *the rate* at which you are going to use it.

For instance, all the electrical equipment in your plant is not operating at full load every minute of the day. All your lights are not burning at the same time. The same thing happens in other plants on the system. Yet, when you start up a motor or turn on a light, you expect to have the electric power on hand to do the work you want it to do. If the power company were to have all this power required to handle all this equipment at the same instant, it would have tremendous amounts of power just standing by most of the time.

So the power companies base their operations on just how much power you use in a given period of time. They use either a 15- or 30-min. time interval. The amount of power in kilowatt-hours, divided by the interval of the hour used for calculations (¼ or ½ hour), gives the average amount of power used during that time in kilowatts. This is the power input to your plant that the power company has to have available for you. The highest amount of power in any one measuring interval is the one that the power company is interested in. The utility has to set aside that much power for you, and it has to be available at any time during the month.

For that privilege you are charged a rate at so much a kilowatt in accordance with prevailing power rates—entirely beyond your consumption in kilowatt-hours. The "demand charge" is like an overhead charge in your business. Certain fixed charges go on during the month, whether or not you produce at maximum capacity.

The demand may also determine the voltage at which you will get your power. The more the demand, the higher the voltage that may have to be used to supply the power.

What will be the monthly load factor? This indicates the percentage of the time your plant will work up to capacity during a normal week or month. This information will determine what contract rate will be most economical for you.

How about the number of shifts you'll work? If you are going to work around the clock, seven days a week, it may be necessary for the power company to provide duplicate facilities. It has to do maintenance work on its lines and equipment.

Can you use power during off-peak periods? These are periods, usually during the night, when the power company has a surplus amount of generating or transmitting loads available which is not being used. The power company is interested in using these facilities, and so offers attractive rates for power used during those hours. Your metering and switching equipment may have to be altered to measure or use this special service. The time to put this equipment in is when you are building the plant. Installation later on may cost you too much money in relation to the savings of off-peak usage, or it may even turn out to be physically impossible.

Are your processes such that you cannot afford any power outages? Just how much of your power load has to be maintained at all times? If the answers are "yes—a great deal," you can really get into expensive electrical equipment. (More about this later on.)

What is your possible growth? This may determine what voltage service you will get.

What special services will you need—such as double line feeds, underground service, enclosed switchgear, underground transformer vault?

Your answers to these and similar questions that the power company will ask you might seem to pertain mostly to the equipment that the power company will furnish. Don't be too sure that is the situation.

Many power companies now require the customers to purchase and install the master substation. If the incoming supply is above 15,000 volts, the substation will include transformers with switchgear and outgoing feeds to the plant distribution system. Even if the power company furnishes the main substation, you may have to pay rental on the equipment. Besides, it will usually give you only one transformation voltage and only in one location in your plant. Therefore it is essential that you know just how you are going to operate the plant and have a fairly good idea of how much power you are going to take.

It is good practice to know well in advance just who is going to furnish what equipment, so that your costs can be determined. In some cases, rebates on the power bill are given if the main substation is owned by the plant and if metering is done on the high-voltage side of the station. Each power company has its own policies.

Higher Incoming Voltages

As power demands grow heavier, and move further from distribution points on the power company's system, higher voltages have to be used to get the power out to the plants with a minimum of losses, and with good voltage control. This in-

troduces high cost into the master substation at the plant. One power company uses these typical ratings for new services:

Ultimate Load	*Voltages*
Less than 300 kw.	2400/4160
300 kw. to 8000 kw.	12,000 to 33,000
8000 kw. and up	66,000 to 132,000

The cost of equipment for the higher voltages and the large amount of space it occupies will surprise upper-management people—particularly those who have just come face to face with this problem for the first time.

The photograph on the preceding page shows what one of these substations looks like. A 20,000-kw. substation at 132,000 volts takes a space 225 x 260 feet—well over an acre, which is quite a long way from three transformers sitting on a pole outside the plant.

2. Better Protection Against Short-Circuit Currents

Higher power loads in industry's plants and greater amounts of power on utility systems have introduced new hazards in plant electrical distribution. Protection is requiring larger equipment, which costs more money. Better new plants are spending for whatever is needed.

The need starts with circuit breakers in the main substation.

Interrupting Capacity Important

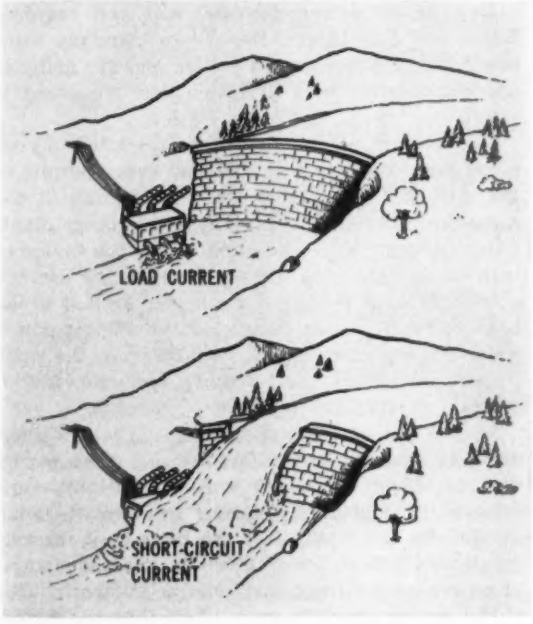
In the past, most plants considered only the load current in buying circuit breakers. Today this is not enough. Better plants are taking interrupting capacity into consideration.

The amount of current that will flow in a cable when short circuits occur is independent of the load on the cable. It is dependent on the capacity of the power system that is supplying power to the cable. It is this large amount of current that the circuit breaker will have to be able to handle when it tries to open the line to shut off the flow of current to the device or cable in trouble. That's interrupting capacity.

Take a simple case. A 440-volt, 10-hp. motor draws about 13 amperes of current at full load. It will draw only this amount whether it is supplied from a 25-kva. or a 2500-kva. transformer. So, if only the load currents are considered in selecting branch-circuit feeder protection, a 15- or 20-amp. circuit breaker would be specified. But this same circuit breaker may have to handle 25,000 amperes of short-circuit current if the power system to which it is connected is large enough to supply that much current.

Let's put it another way. Short-circuit currents and load currents are analogous to the flow of water in the hydroelectric plant in the accompanying sketch. The amount of water that flows under normal conditions is determined by the load on the turbines. Within limits it makes little difference whether the reservoir behind the dam is large or small.

On the other hand, let the dam break. The amount of flow will depend on the capacity of the reservoir and will bear little relation to the load on the turbines. Whether the reservoir is large or small will make the difference between a damaging flood and minor overflow of the river bank. This damaging flow of water is comparable to the flow of current through the power distribution system in your plant when a short circuit occurs. Load currents like the water flowing through the turbines do useful work. Short-circuit currents on the loose are like the flood waters that produce damaging effects.



NORMAL LOAD AND SHORT-CIRCUIT currents are analogous to conditions shown at this hydroelectric plant.

Circuit breakers that will contain this "loose current" must be able to handle the maximum amount that can be introduced by the power system. Therefore, circuit breakers are being bought more and more for interrupting capacities as well as for load-current ratings.

In the past, there has been a mystery surrounding short-circuit currents that made many engineers disregard them entirely when designing power systems. In many cases, due to the small

amount of power delivered by the power companies and with small incoming substations, no great harm could be done. But the picture is changing rapidly.

Calculations Now Simplified

Today, fortunately, calculating procedures have been greatly simplified. You no longer have to have three or four college degrees to be able to figure out the amount of current that will flow in various parts of your distribution system in case short circuits occur. Simple arithmetic usually will do the trick.

The power company can tell you how much power it can deliver to your main substation in case of a short circuit. Your men can take it from there. On very large systems, the power company can put the problem on its power calculating machines and come out with the answer in no time.

Then manufacturers of power distribution equipment can help you determine what size equipment is the best for your needs.

For example · A plant in the Middle West was buying a main control switchboard for its incoming power supply. It consisted of 8 sections, for 2 incoming feeders and 6 outgoing feeders. The cost of 250-mva. switchgear which would adequately protect the plant was $47,300 as against $43,000 for the 150-mva. switchgear originally specified by the user. But the total cost of the whole electrical installation was over $250,000, and the cost of the whole plant ran into $4.5-million. And this amount usually is amortized over a period of 15 or 20 years. Where can you get cheaper protection against blow-ups in your switchgear that may shut you down for weeks?

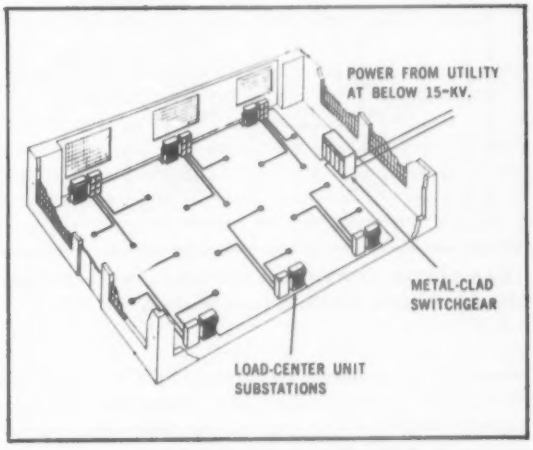
Another point to watch out for is expansion—not only of your plant but, more important, of the power company's system. It's a good idea to check with the power company and find out its plans for the future. If you don't, the wonderful and adequate equipment you bought today may be wholly inadequate tomorrow when the power company increases its capacity to take care of its own increase in power demands.

3. High Voltages in the Plant

There are two ways to transmit power within the plant:

1. Transform the voltage at one point as received from the power company to the voltage at which you are going to use it, and then distribute this power throughout the plant.

2. Use load-center distribution, which is becoming the more popular with new plant installations. This system (see sketch) employs high voltage, in some cases the same as supplied by the power company, and distributes this high-voltage power throughout the plant. All you need in the master substation is switchgear and metering. Unit substations at the centers of the electrical loads transform the high-voltage power to the utilization voltages. You distribute this low-voltage power to the various equipment where it is needed.



HIGH-VOLTAGE DISTRIBUTION in a plant taking in power at 13,800 volts, using load-center unit substations.

Advantages of Load Centers

Many new-plant owners find that load-center distribution offers many advantages over the first method:

1. Lower first cost.
2. Less voltage drop.
3. Reduced engineering and planning.
4. Lower cost for future plant expansion.
5. Easier installation.
6. High salvage value.
7. Greater flexibility.

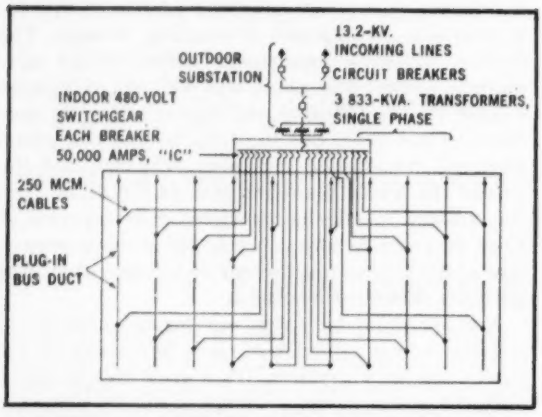
As an example, let's use a 250,000-sq. ft., single-floor factory with the usual assortment of machine tools, heat-treating equipment, etc. Prices we'll use are approximate, as they will vary because of specific design and other factors. But the proportions in cost between the various components in both systems will not change much.

The diagrams on the next page show the two methods of power distribution which can be used.

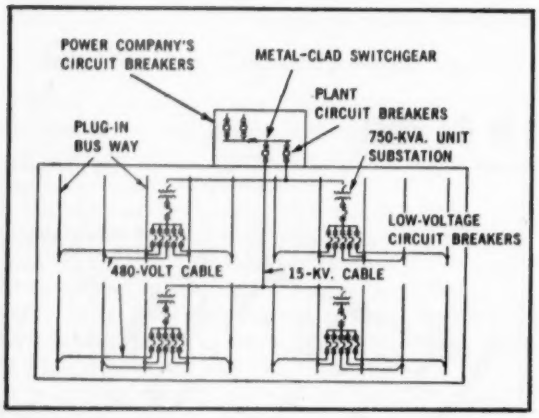
The large substation with individual pieces of equipment is located outside the building and the long low-voltage (480-volt) feeders are used to serve the load. This power system from the 13.2-kv. incoming lines to the 480-volt plug-in busway would cost about $100,000 installed. The transformer capacity of this system is 2500 kva.

The more modern load-center system for the

TRENDS . . . *Begins on page B-198*



DISTRIBUTION SYSTEM USING ONE LARGE SUBSTATION and long 480-volt feeders to supply the loads.



LOAD-CENTER SYSTEM using four 750-kva. load-center units to supply the same plant load as shown above.

same plant would cost about $83,000 installed. With this system, there are now four 750-kva. transformers, so that capacity is 3000 kva., an increase of 20%. The switchgear and transformers cost about the same in either installation, but there is a big saving in System 2 in cost of cable.

There are other savings, too. For instance, the circuit breakers that protect the 480-volt feeders. In System 1, for proper protection, you have to use circuit breakers that can interrupt 50,000 amperes. In the load-center system, these circuit breakers have to handle only 15,000 amperes, and they're a lot less expensive.

Higher distribution voltages will also reduce power losses in your system. This saves you money.

You will also get less voltage drop by using high-voltage distribution. This gives better performance from motors, lighting, furnaces, etc.

Engineering and planning are reduced, because the load center substations are factory-designed. They can be installed indoors or outdoors. The equipment is factory-assembled. The various components are coordinated by the manufacturer. Installation consists only of bolting the various sections on a flat surface and tieing in the incoming high-voltage cables and the outgoing feeders.

You Save When You Expand

As your plant grows—or new processes require more power—extra savings come to you when it is necessary to expand your power system.

Suppose that the plant that we used for illustrating purposes has to increase its power load by 1200 kva. Using low-voltage distribution, this means adding 1200 kva. to the main substation. When more transformers are added to the existing substation, the short-circuit currents are increased on all circuit breakers. The short-circuit duty will be increased so much that the circuit breakers will become inadequate. Here is your bottleneck to power expansion. You will either have to change the size of the circuit breakers or build another master substation to split up the load.

Contrast this with the load-center system. Here it is necessary only to extend the two high-voltage feeders and add two load centers. The short-circuit currents are not increased on any circuit breakers.

High Salvage Value

Should processes change, and radically different power system layouts be required, the load centers have high salvage value. They can be moved readily in a few sections from one location to another.

The load-center system provides greater flexibility. Small units may be added when and where the loads are needed. Continuity of service can be greater with a small number of substations scattered around the plant. A substation failure affects only the small area serviced by the load-center substation instead of the whole plant

SELECTION OF SYSTEM VOLTAGES · There is a choice of 2400, 4160, and 13,800 volts on the supply for the feed to the load-center substations. Some plants use 4800 or 6900 volts; the use of these voltages may offer some problem in getting equipment, and most plants stick to standard-voltage equipment to keep costs down.

Utilization voltages are usually 480 or 240. The trend is toward 480. Some plants—mainly textile—use 550. And 208/120-volt systems are used where power and lighting are on the same circuits.

What Voltage Is Best?

There are several factors that affect the choice for your plant. Chief among them are:

1. Size of the load.
2. Distance that power has to be transmitted.
3. Utilization voltages of equipment to be served.

4. Safety.
5. Codes and standards.

We can dispose of factors 4 and 5 quickly. Local conditions will govern your choice. In general, though, most manufacturers' equipment will satisfy the local code requirements. As equipment goes up in voltage ratings, it gets safer, provided the application is correct.

Loads and Distances

In selecting your primary voltage to supply the various load centers throughout the plant, the size of the load and the distance to be covered are the two most important factors. If the plant is compact, then only loads are important. If the plant is spread out—perhaps with several scattered buildings—both loads and distances have to be considered.

In general, either of two voltages will suffice in the majority of plant loads:

Load	*Voltage*
Under 10,000 kva	4160
10,000-20,000 kva	4160 or 13,800
Over 20,000 kva	13,800

Another factor to be considered in choosing between a 4160-volt and a 13,800-volt system is whether or not you have large motors in your plant that require high voltage. Motors over 200 horsepower are most economically operated on systems of 2400-4160 volts. Therefore primary power distribution at 13,800 volts, with a secondary step-down to 480 volts for most of the load, will require extra transformers to take care of these large motors. In such a case, distribution at 4160 volts will enable you to operate these large motors directly from the primary distribution lines.

There are two advantages in using 4160-volt instead of 2400 volts systems—lower costs and greater allowances for expansion of the system.

Switchgear of a given size (interrupting rating) to handle 4160 volts costs less than 2400-volt switchgear. Another advantage costwise in switchgear is that often a 1200-amp. circuit breaker will carry the required load at 4160 volts. The same load at 2400 volts might require a 2000-amp. circuit breaker, which is much more expensive.

You can carry more power on circuits operating at 4160 volts than at 2400. This will result in fewer circuits in the system, thus fewer circuit breakers and less switchgear. Cost of your cables will also be lower.

It's easier to expand 4160-volt systems. The largest metal-clad circuit breakers made for 2400-volt service are rated at 150,000 kva. For 4160 volts, the maximum is 250,000 kva. This permits a much larger system to be built with 4160-volt equipment than with 2400-volt equipment, without resorting to complicated systems with expensive means of reducing the fault current.

UTILIZATION • Voltages for the majority of equipment in industrial plants are under 600 volts. For general utilization, 480-volt power is most popular. While 600-volt distribution systems are from 2% to 7% less expensive than 480-volt systems, 550-volt motors and control equipment are not so readily available. Pumps and other equipment using direct-connected motors are generally stocked with 220/440-volt motors. So 550-volt equipment is pretty much limited to those plants already having such systems and either expanding these systems or wanting to install this type in new plants to be able to exchange equipment with several existing plants.

There is seldom any economy in selecting 240-volt instead of 480-volt distribution. In the first place, 240-volt systems cost 35% more than 480-volt load-center systems. Losses are higher, and more voltage drops will give you trouble in operation of motors, lighting, and other electrical equipment in your plant.

Good plants with electric furnaces are buying the furnaces to operate on a 480-volt system. If, for some reason, only 240-volt elements are available, this particular furnace load should be supplied by its own transformer, which can transform the 480 volts to 240 at the furnace. Seldom is it economical to use a 240-volt distribution throughout the plant, even though a major part of the load is from 240-volt furnaces.

If you are building your plant inside the city limits, the power company may be able to supply a 208/120-volt, 4-wire system direct from its network. In this case you will not need any substation in your system.

But only limited power is usually available at that voltage. Also, such distribution within your plant may be very uneconomical. Unless 50% or 60% of your power load is at 120 volts, such as in a clothing manufacturing plant, or an electronic assembly plant using many hand tools and soldering irons along with a heavy lighting load, it will probably pay you to go to 480-volt distribution, even if you have to buy the substation.

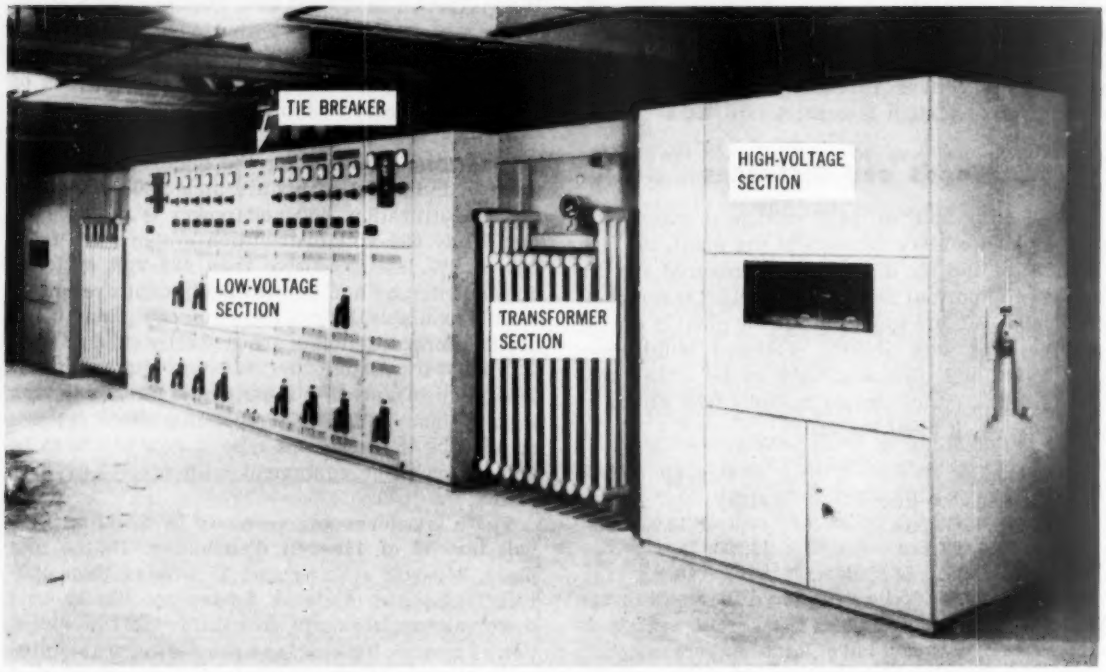
4. More Unit Substations

Load-center substations, the heart of the high-voltage distribution systems, consist of three basic parts:

(1) Incoming line section or high-voltage side:
(2) Transformer section; and
(3) Low-voltage feeder section.

Each part can be made up of different components according to individual needs in the plant.

Turn the page



DOUBLE-ENDED UNIT SUBSTATION—SHOWING THREE COMPONENTS THAT MAKE UP EACH HALF AND TIE BREAKER.

Incoming Line Section

This may consist of high-voltage circuit breakers (either oil or air type), junction boxes, or interrupter switches with or without power fuses. The trend is toward circuit breakers. They offer the greatest protection to the equipment and the system. Relays will disconnect the unit stations from the line in case of trouble without disturbing the rest of the system. These circuit breakers are usually of the draw-out type. This permits the withdrawal of the circuit from within the steel enclosing structure for inspection and maintenance.

If the unit substations are fed from high-voltage switchgear in the main substation, you will not need any disconnect switches at the unit substation. In this case, only a high-voltage junction box will be needed on the side of the transformer section. This will provide means of terminating the high-voltage cable and connecting the cable to the terminals of the transformer.

Another high-voltage section may use disconnect switches. These switches may be large enough to interrupt the full load current of the substation. But usually they are interlocked with the main low-voltage circuit breaker so that the switch cannot be opened until the low-voltage circuit has been opened, thus removing the load from the station. In this way, a smaller switch can be used. If you use the load-break type of switch, these switches can be supplied with high-voltage fuses. This combination will provide protection for the substation and also a means of disconnecting the station from the incoming power supply for maintenance purposes.

If your distribution system has two high-voltage feeders for each substation for greater reliability of service, the primary section may consist of two circuit breakers or selector switches to select either of the two feeders. In case one cable gets into trouble, you can shift to the other cable and resume operations until the cable fault can be repaired.

Tranformer Section

This part of the substation consists of an oil-cooled, askeral-type, open ventilated dry-type or sealed dry-type transformer.

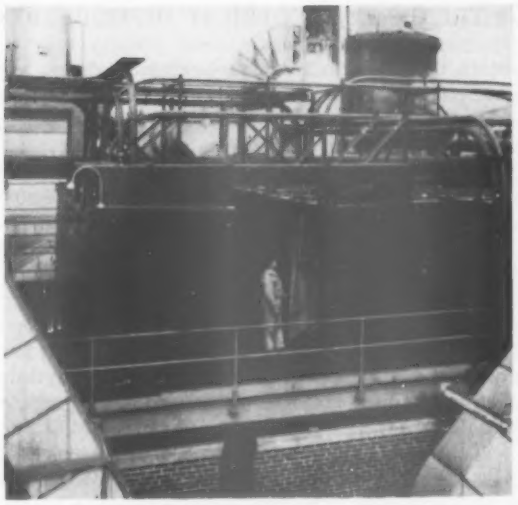
Oil-filled transformers are usually the cheapest. Usually, however, they must be installed outdoors; if used indoors, you must provide suitable fireproof vaults. These limitations may defeat the purpose of the unit substation in getting the station near the load it is to serve.

Askeral-type transformers use a cooling oil which is non-flammable. This permits the installation of the unit substation indoors without any vaults. Many unit substations are installed right in the working areas with only a rail around the unit for protection from plant traffic.

Open-ventilated dry-type transformers contain no cooling liquids, and are in general much lighter in weight than the oil askeral types. Frequent attention is required to keep the air ducts clean for efficient cooling. It is best to locate substations with this type of transformer in clean locations away from the plant dust and dirt. Their lighter weight is a great advantage when substations are mounted on the roof or on balconies.

Sealed dry-type transformers have many of the advantages of liquid and open-ventilated dry-type transformers. They can be installed outdoors or in dusty locations. They can be installed right in the middle of a manufacturing floor without vaults. They are fire- and explosion-resistant. They are unaffected by atmospheric conditions. But they are larger in size physically than any of the other types. They cost more, too.

In picking the type of transformers for your unit substations, be sure that your decision includes all the costs. Mechanical construction may often be the deciding cost factor.



UNIT SUBSTATION MOUNTED ON ROOF of the plant. Switchgear is outdoor type and is weatherproof.

Secondary Switching Section

This part of the unit substation is the end that really produces for you. It consists of a main circuit breaker that connects the transformer section with the low-voltage bus. To the main bus are connected the various circuit breakers that serve to protect the feeders running from the unit substation.

Here, again, as in the high-voltage section, better plants provide draw-out-type circuit breakers. These circuit breakers provide a high order of protection, reliability, and ease of maintenance. All parts are metal enclosed for safety.

On some of the smaller units, up to 300 kva., you may want to use molded-case circuit breakers. They find their widest application where operations are infrequent—such as with low-capacity lighting panels and power panels. These circuit breakers are bolted directly to the busbars. Any work on them, or removal to install a larger breaker, will call for a complete shutdown of the unit substation. It is well to weigh this factor in deciding if it is economical to use the molded-case type of circuit breaker, even though it is usually cheaper than the draw-out type.

Location of Unit Substations

Where to locate your unit substations is often a problem. They are compact, but still take up some room. And that room is usually right in the middle of some very valuable floor space in somebody's production line. Here is one problem where close cooperation between the production and plant engineering departments pays off. Sometimes a compromise has to be worked out in which a more costly electrical installation will pay off in lower total plant cost.

For example, a plant in St. Louis had such a problem. Unit substations would have seriously cut up production processes. They simply had to be off the manufacturing floor. The electrical engineer insisted on having the substations in the center of the loads. This meant balconies, to the tune of $240,000. Management balked at that cost.

There was a basement nearby which was to be used as offices. By relocating the offices and putting the unit substations in this basement, the electrical installation cost $35,000 more for cables, but the total savings over the cost of the balcony, including cost of relocating the offices, amounted to over $125,000.

The plant wound up with a distribution system that cost more to install electrically, but management saved plenty of money on the deal. With the money saved, the electrical engineer was able to add some features to the distribution systems that would have been ruled out otherwise.

This illustration is not intended to imply that balconies are out as sites for substations. In this particular case they cost too much money for mechanical construction, and these costs far outweighed the electrical advantages.

In general, balconies are wonderful places to put substations. The equipment is remote from normal factory traffic. It is easier to keep unauthorized people away from the switchgear. If you get a flood, the substation has a better chance for survival. On the other hand, substation equipment is hard to remove from balconies.

Some plants locate their unit substations on the roof. This is a natural for distribution purposes. Most of the distribution, both high- and low-voltage feeders, are on the ceiling anyway. This makes for short runs into the switchgear. The substation on the roof does not interfere with any rearrangements

inside the plant to meet production changes. You get better ventilation on the roof—although, where summer heat is excessive, you may want to put up some sort of shelter from the sun's rays.

You can get weatherproof construction in unit substations. You might think that this type of construction is expensive. In general, however, a weatherproof substation will cost you less than the indoor type of substation with a housing built to enclose the equipment. Somehow it always seems that outdoor substations get in trouble during a cloudburst or a blizzard. Your electricians will give enclosed equipment a little more care. Anything that is hard to maintain usually is never maintained.

With the stations remotely located on the roof, it may be advantageous to use electrically operated circuit breakers. This will cost you more money. But it takes time for the electricians to get up to the roof and re-close the breaker. The downtime of equipment that is being serviced by this substation may well influence you towards the more expensive circuit breakers.

If you put substations in the basement, there are some precautions to take. Watch out for the water table in your locality. Take test borings. A flooded substation will close down your plant in a hurry.

Ventilation is also a problem. So is accessibility. Make sure that you can get the transformer out of the basement without ripping up the plant—or the plant manager's office.

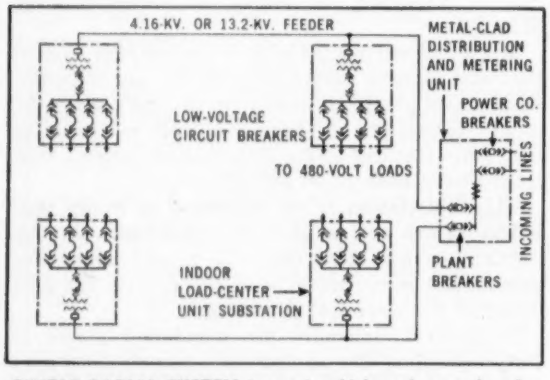
Unit substations are also located outdoors adjacent to the building walls—on a concrete pad surrounded with a wire fence. The extra cost of weather-proof switchgear can be offset somewhat by using oil-filled transformers.

Another combination is to locate the transformer outdoors and the switchgear just inside the building. This arrangement takes the heat of the transformer from inside the building, which is especially advantageous if your plant is air conditioned.

5. More Flexible Circuit Arrangements

There are three basic circuit arrangements you can use in your new plant: (1) simple radial; (2) secondary selective; (3) secondary network.

Regardless of the circuit you may choose for your plant, service reliability will depend primarily upon adequate modern equipment, properly installed and maintained.



SIMPLE RADIAL SYSTEM is one in which each secondary bus is served by one primary feeder and one transformer.

Simple radial system is by far the most popular. Because there is only one primary feeder and one transformer through which a 480-volt load is served, there is no duplication of equipment. This system costs less than the other two basic types of circuit arrangement.

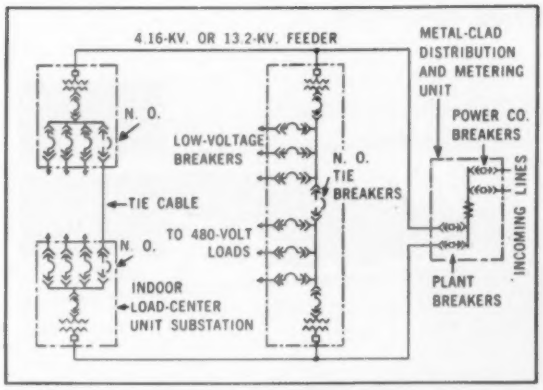
If sufficient substation capacity is used in the radial arrangement to provide about 10 to 15 volt-amperes per square foot of manufacturing area, you will be able to take care of most shifts in load areas due to changes in manufacturing processes.

The reliability of such a system depends on the transformers and the primary cables feeding the substations. General Electric estimates from its operating records that transformers average about one failure in every 2500 transformer-years. High-voltage cables average about one failure per mile per 100 years of service. Considering these facts, this radial system gives you reliability from outages that ought to satisfy most plants.

You should remember, however, that, if by chance the average doesn't hold for you and you do experience trouble with primary transformers or cables, the area serviced by this unit substation is out of power. It will be without power until emergency provisions are made, the downtime depending on amount of damage and difficulty in making repairs. Also, any maintenance to the equipment or cables will necessitate a complete area shut-down.

Secondary selective system. This type of system will cost you from 10% to 30% more than comparable radial systems, depending on the relative substation sizes and locations. Here is what you may expect to get for this increase in cost:

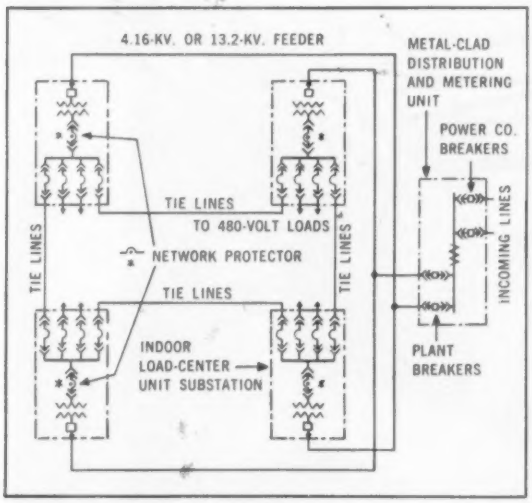
You can now take a feeder or transformer out of service at any time by closing in the tie breaker and opening the 480-volt main breaker and primary disconnect switch. In case of trouble, the same procedure can be followed; thus power can be restored in a matter of minutes after a power failure. You will have to curtail non-essential loads during this operation if the two transformers involved are each



SECONDARY SELECTIVE SYSTEM is a modified simple radial, with normally open tie breakers between substations.

loaded to capacity, because transfer of load to the one transformer would overload that transformer by 100%.

If you cannot drop sufficient load, it will then be necessary to carry extra capacity in each transformer, and use fans. Allis-Chalmers recommends the use of a spare transformer that fits all the unit stations. In a transformer failure, the area served by the station in trouble would be down for the period it takes to change transformers. The spare transformer would also be available to provide extra transformer capacity in case the system has to be expanded. With this plan you do not need additional capacity in the transformers.



SECONDARY NETWORK SYSTEM has unit substation with all transformers paralleled through secondary tie circuits.

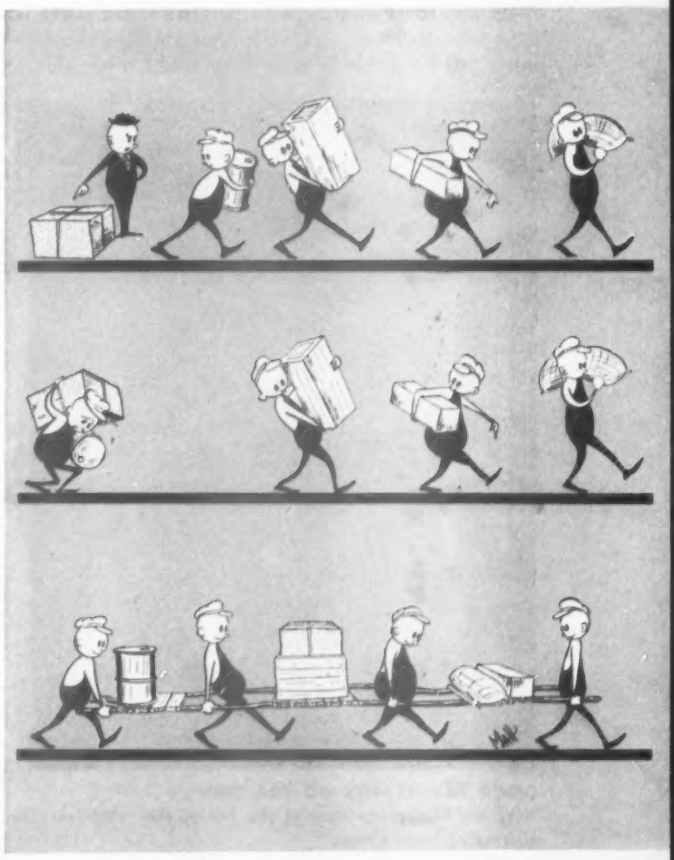
Secondary network. If your processes are such that you cannot possibly stand any power outages at all, this may be the system for you. It is the most expensive, but it offers greater reliability.

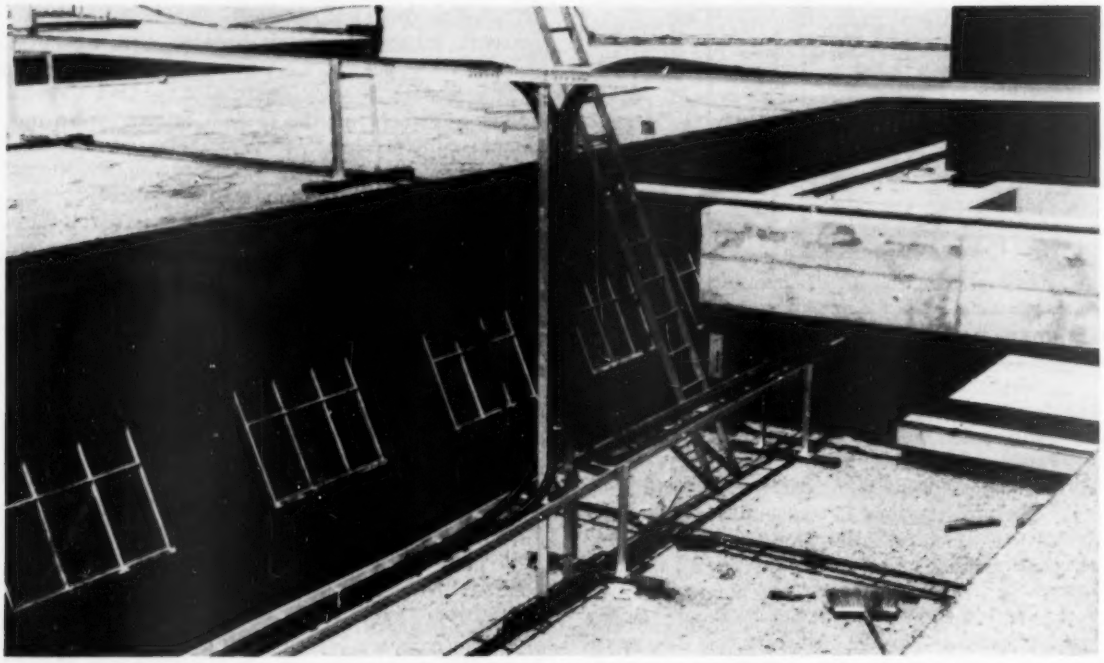
All the unit substations have their 480-volt feeders tied together in a loop or network. The high-voltage feeders are the same as in the radial or secondary selective systems. Each transformer contributes to the load network, and feeds into the network through a circuit breaker or a network protector.

This system is very flexible. Any load that is added anywhere on the system is shared by the system collectively. The system also permits the removal of any substation for maintenance without disturbing any service to any of the connected loads.

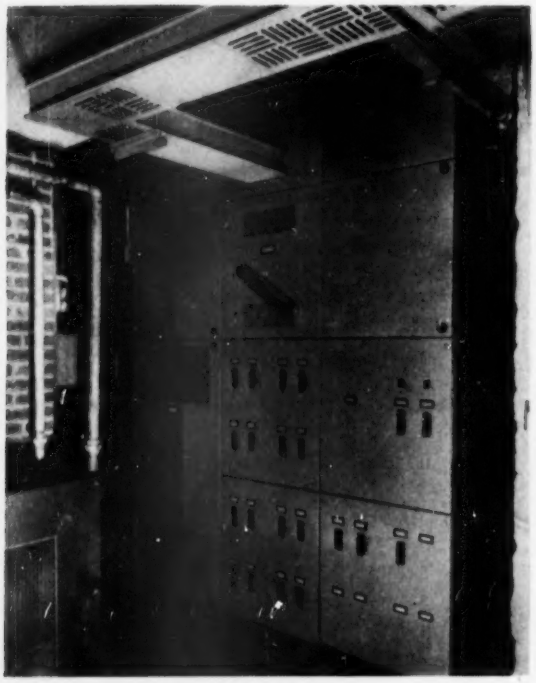
The network system can be simply explained by referring to the industrious group of workmen in the accompanying Westinghouse cartoon. In the top strip, each workman is busily carrying the load assigned him with little thought or concern of his fellow-workers. When an additional load is added to the already diversified burden (middle strip), it falls on one man's shoulders. Although he picks it up and carries it, it is only with damp, furrowed brow and a slight buckling of the knees. But let a network be installed (bottom strip); not only does the common sharing of the load compensate for an occasional smaller worker, but it also makes the addition of more load a simple matter. There's no straining, no staggering, no lost steps.

Turn the page





INTERLOCKED-ARMORED CABLE SUPPLIES 13,200 VOLTS TO UNIT SUBSTATIONS ON THE ROOF OF AN AIRCRAFT PLANT.



GOOD NEW PLANTS GO FOR THIS . . .
Note the feeder bus duct at the top of the switchgear and absence of loose wiring.

. . . INSTEAD OF THIS
This is not an isolated case either. It is the result of "penny pinching" by management.

6. Better Conductors

High-voltage power from the master substation to the individual unit substations is carried over cables. In the past, many plants buried lead-covered cables in underground ducts. Lead jackets called for specialists known as cable splicers to make up the lead joints, so the cost of the high-voltage feeders came high.

Today there is a trend away from lead-jacket cables. New developments in insulation make it possible to do away with the lead and make splicing much easier.

Cables Going Up

Cables are coming out of the ground and are being run along the ceiling and over roofs. There are still people who are afraid of running 13,200-volt cables overhead, but many new plants are proving that such fears are unwarranted. Some plants have had these cables out in the open for years.

Interlocked-armored cable, which looks somewhat like "BX," is being used in many modern plants. You can pull and bend this type of cable easily. And you don't need any conduit. It is easy to follow contours of roofs, with their many rises, slopes, and angles. You can make installations with numerous 90-deg. bends. Aluminum racks are available to support the cable.

Low-voltage power is being distributed well in several ways. Each type of conductor has its own application, despite "fads."

Advantages of Bus Duct

Bus duct can serve two functions. It can be used as feeders to carry heavy power from a switchboard and distribute this power to other bus-duct runs or to panelboards throughout the plant. It can also be used to carry the low-voltage power from transformers to the switchgear in case you are not using unit substations. In carrying loads up to 5000 amperes, bus duct has a greater current-carrying capacity, pound for pound of copper, than most types of cable in general use.

But it is out in the plant where it will do the most for you. By using a different type of bus duct known as "plug-in" duct, it will be possible to take power from this duct to operate machine tools, furnaces, pumps, lighting transformers, welding equipment, etc., through openings at 1-ft. intervals along the whole length of the duct, if you so desire.

Installation of the duct is simple and easy. There are all sorts of bends, cross-overs, tees, and other shapes, to get around columns or over piping. Of course, the job has to be engineered, but the manufacturers' field engineers take care of all that for you. When the duct arrives, you just assemble, hang it up, and there is your power.

Most bus duct is run along ceilings or along beams and columns. If you have high ceilings and supporting columns are far apart, don't let that stop you. One plant with this problem hung the duct 8 feet off the floor, using pipe racks.

New plants that don't expect to move equipment around very much, or where electrical loads aren't concentrated, usually use cable in conduit—and distribute from panelboards. There are some modern trends in this type of distribution, also.

Conduit fittings are an example. One manufacturer has provided his fittings with extra hubs where you insert the conduit. When you need to take off an extra conduit line, you merely remove the plate on the side of the fitting which has only one opening and replace it with one having two or three openings—without disturbing the rest of the conduit run.

Interlocked-armored cable is coming into use for low-voltage feeders to panels. The same flexibility can be had as with the high-voltage cable, so far as installation is concerned.

Trolley Busways Add Safety

Power supply to mobile equipment is improving. Cranes are one example. The old way was to have open conductors with a trolley wheel engaging the conductors. The trolley was attached to the crane and moved with the crane. Open conductors were dangerous to workers.

The modern way is to encase the conductors in a metal enclosure and have the trolley make contact inside the enclosure. This system is known as trolley busway.

Trolley busways are not confined to cranes. They are used for supplying power to portable tools and machines that move. One steel mill has a welder that moves with steel strip and welds a seam as it moves along, so that the rolling operation does not have to be stopped to weld two coils together. The power here is 500 amperes at 480 volts, which is a good amount.

Test lines where testing is done on a movable conveyor are another application of trolley busway. Here power has to be supplied for long runs while testing operations are being done.

You may want to move lighting fixtures around. There is a busway system that permits you to hang the fixtures on trolleys. Plug-in devices feed the 120 volts as the lights are moved along. This system is also used for small portable tools, which can be hung directly off the busway.

One device worth having if you put up a trolley system is the pick-up that has its own built-in fuse protection. Individual fusing of the devices will isolate the trouble to the particular tool and not disturb the rest of the system when purely local trouble develops.

Turn the page

7. Better Controls

The modern trend in motor control is toward the use of control centers. Control centers take all motor starters that are scattered around old plants and put them in one piece of switchgear.

Here is what such an arrangement of controls will mean to you:

1. It clears your floors for action. Mounting of controls at individual machines with necessary floor allowances for working on the controls is eliminated.

2. Easier maintenance. Controls are away from dirt, fumes, chips, and moisture from coolants used on machines and equipment.

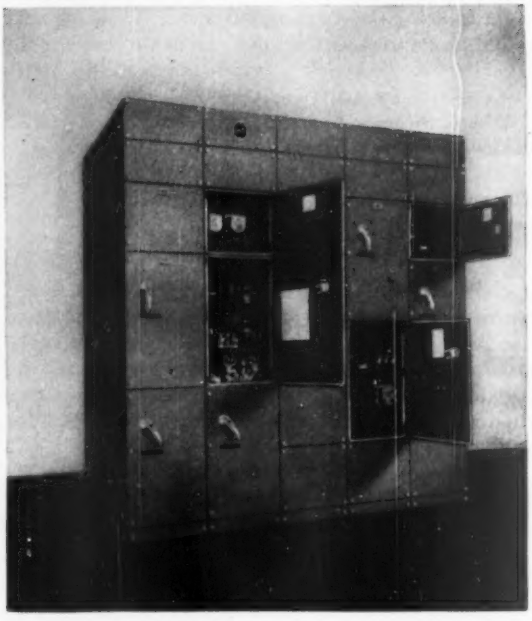
3. Greater safety. Interrupting capacities of devices are engineered into the control centers. And you also prevent Helpful Harry, the machine tool operator, from fooling around with the controls and playing electrician. Control centers are away from the equipment and can be kept locked up to prevent unauthorized persons from tampering and making adjustments.

4. Economy in installation. All the internal wiring between the power supply and the controls can be done at the manufacturer's plant.

5. Flexibility. Individual starters plug into the structure like switches on a bus duct. Quick interchange of various sizes of starters can be made when production needs require changes in motor applications.

6. Centralized controls. Save time of trouble shooter when equipment breaks down.

7. Expansion. Individual structures are free standing and are bolted together. To expand, just bolt on more sections.



MOTOR CONTROL CENTER with the doors opened to show motor starters inside the enclosures.

Centers can be furnished with various control devices. These include combination motor starters of various sizes, reduced-voltage starters, multi-speed motor starters, contactors, distribution transformers for lighting circuits, lighting panelboards, circuit breakers, and panelboards for mounting meters and instruments.

Motor control centers are especially suited for dusty and dirty work areas. You can easily install a control center in a separate room and pressurize the room with a small blower. That will keep out the dust and dirt.

8. Combined Power and Lighting Circuits

With the trend toward higher lighting loads, supplying these loads becomes a distribution problem.

For years plants have used 120 volts for lighting. Most lighting systems used incandescent lamps, and 120 volts was the best voltage rating for these lamps. With fluorescent and mercury lamps, a ballast has to be provided which includes a transformer necessary to step up the voltage above 120 volts to start the lamp. Why not get this higher voltage direct from the lighting system?

With fluorescent and mercury lamps, you can get your lighting right from your 480-volt power system without any step-down transformers. Many new plants today are using a 480/277-volt, three-phase power supply for lighting. One plant is using straight 480 volts for lighting.

Here are four basic ways to distribute power for lighting in your plant.

System A. Use a separate substation for supplying power at 480 volts and lighting at 120 volts. This is the most expensive way.

System B. Use small dry-type transformers at the center of the lighting loads, fed from the 480-volt distribution system and reducing the voltage to 120 volts. This saves about 25% in cost.

System C. Use 277 volts for lighting distribution

fed directly from the 480-volt system, using "4-wire grounded neutral" wiring. This system is confined in use to fluorescent and mercury lamps. This saves approximately 40% in cost.

System D. Use 480 volts direct to the lighting fixtures. This represents a saving of 50%.

The savings shown are for a particular installation. They are approximate and represent calculations for the distribution part of the system only. Pick out your lighting system first, then look at the four methods to see which will cost you the least to supply your system.

Why Lamps Flicker

A point to consider is voltage flicker in the various systems. Voltage flicker is caused by dips in voltage, which, in turn, are caused by sudden application of heavy loads to the system. These loads may come from the starting of large motors or from resistance welders.

When resistance welders first strike an arc, they draw extremely heavy current from the line. More and more of these welders are being used in plants.

It's a good idea, therefore, to check plant operations and processes before deciding on your lighting system. In System A you will not get lamp flicker, because the lighting system is separate from the power system. In Systems B, C, and D you can get away from flicker by making sure that your welders are not connected to the substations from which you are getting your power for lighting.

System C will also require the grounding of your 480-volt power system. This may bring up much discussion with your operating personnel on the advisability of grounding power systems.

A "system ground" is a positive connection of one of the current-carrying conductors to a ground (which may be rods driven into the ground, steelwork in the building, or water pipes). The decision of whether or not power systems should be grounded is not always based on rigorous engineering analysis. Too often it is based on past experience, or hypotheses, or just plain off-the-cuff opinion.

It is not in the scope of this article to present all the arguments for and against grounding. One thing is certain: You are going to get "grounds" on your system whether you like it or not. Grounds are caused by breakdown in insulation, such as a bare wire touching the conduit, or the winding breaking down in a motor. As systems grow larger and larger it becomes that much more difficult to track down these grounds and remove them by making the necessary repairs. It would seem to me that a grounded system that you knew was grounded could be controlled better than one on which grounds appear here and there.

9. More Use of D-C Power

Your new plant may need direct-current power in larger quantities than ever before. The trend in many machine tools and much process equipment is for some means of adjusting speeds of the equipment to get the most efficient output. A simple way of getting this adjustable speed is by means of d-c electric motors.

The major problem with d-c power has been with its transmission and distribution. You cannot raise the voltage as with alternating current by the use of transformers. Distribution has to be at the voltage at which it is generated—and this is relatively low, mostly at 600 volts or lower. Power distribution at these voltages is limited to short distances—the same limitation as with alternating current.

You can use the same distribution methods as with a-c power. Namely, get your utilization power from load-center substations. Direct current can be supplied at these load centers by using high-voltage a-c power to those points and converting the a-c to d-c at the load center. A-c motors driving d-c generators have been the main source of getting d-c power supplies in the past. They are still used in reversing mill drives. Mercury arc rectifiers are supplanting them in most other steel mill drives, including the large main roll drives. Also, rectifiers are being used more and more for fixed-voltage d-c power requirements.

Which Rectifier to Use?

Rectifiers are devices that change a-c power to d-c power by means of electronic tubes, mercury pools in tanks, selenium cells, or copper oxide plates. The mechanical rectifier is a newcomer to the field. Various sizes in the loads and operating conditions dictate which type you should use. You can get a wide range of voltages—from 6 and 12 volts for plating, 125 volts for lighting, 250 volts for general motor work, 600 volts for steel mill and printing press drives, up to 750 volts for electrochemical processes, as in the manufacture of aluminum, chlorine, and magnesium. Still higher voltages for communication purposes and electrostatic work are obtained, ranging up to 20,000 volts d-c. The current ratings are available at any of these voltages to do the job required and range from a few amperes for electrostatic work to thousands of amperes for electroplating and up to 100,000 amperes for some electrochemical processes.

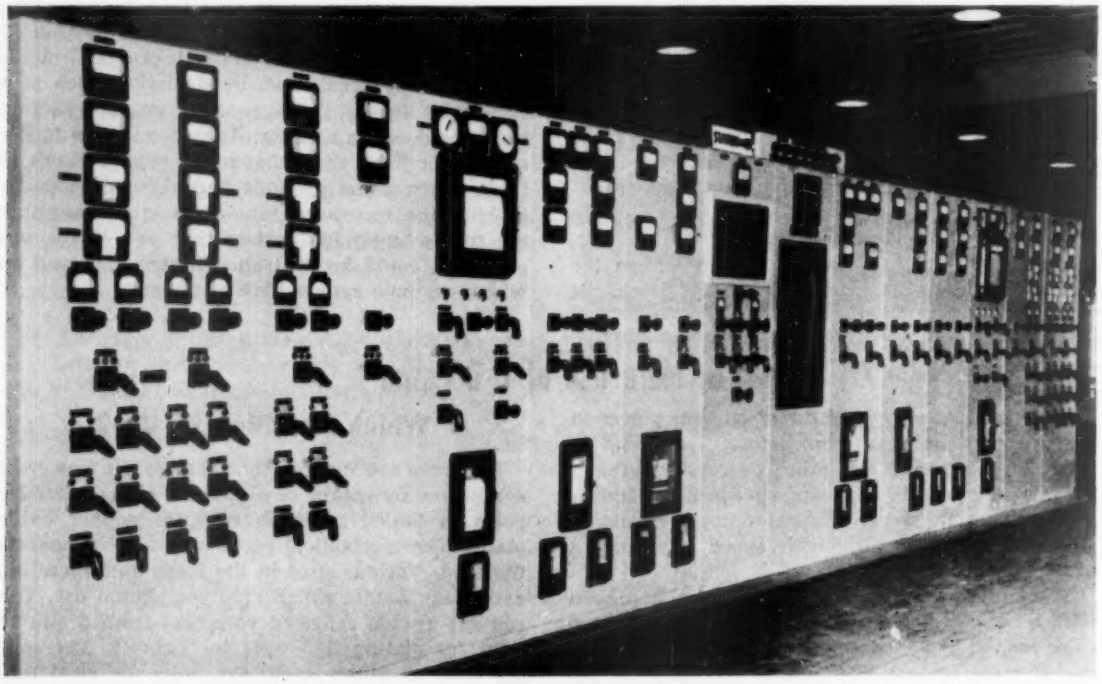
There are few moving parts in rectifiers. In the metallic rectifiers, the cooling medium is air which is supplied by a fan—which possibly means a ventilating system. In the tube-type or tank-type rectifiers, cooling is by water, which means possibly a pump or other means of heat exchanging. The mechanical rectifier has a small motor drive in its conversion unit plus an oil-cooling pump.

Turn the page

This lack of moving parts lends itself to low maintenance. The units can be set up right in the manufacturing area the same as the load-center substations which they resemble in appearance. They may even be mounted on a balcony to release valuable manufacturing floor space. You simply run in high-voltage a-c cables, provide a source of water for cooling, and run out your d-c distribution feeders.

D-c power can be distributed through the plant the same as a-c. You can use bus duct, cable in conduit, power panels, armored cable, etc. It may be a little cheaper as you will need only two conductors instead of three. But you may have to use 250 volts for d-c distribution instead of 480, so you will need larger conductors.

Most d-c power is distributed at 250 volts for normal motor loads and at 600 volts for very large motors and in the electro-chemical applications. There is much interest at present in the higher voltages. With the great advancement in insulation and in safety design, the fear of using higher d-c voltages is as old-fashioned as hoop skirts. It would be smart to investigate the economics of using higher-voltage d-c for your new plant. The power sources and some of the equipment are available. You could then take advantage of the efficiencies of power distribution at high voltages.



TUNNEL-TYPE, DUPLEX SWITCHBOARD CONTROLS 154-, 13.8-, 2.4-KV. AND 480-VOLT A-C POWER AND 12 RECTIFIERS.

10. Design for Operating Economies

An important trend is the attention that is being directed at getting a distribution system that lends itself to saving money on the power bills. So out goes the word to the operating departments, "Cut down the power bills."

Two Ways to Cut Power Bills

The easiest way to cut down power bills is to stop using power. But then you do not produce any goods. There are better and more practical ways.

First, examine your power contract. You will find it is made up of three or four different sets of charges depending on the rates which you get from the power company.

Second, see that your distribution system is so designed that you can get some of the benefits that these rates can do for you.

Demand Charge

The first charge that you run into in the power bill is demand. The technicalities of demand were explained in Trend 2 (page B-202). You can save money here if you:

1. Install instruments on your switchgear so

you can tell *where* your power is being used — and, more important, *when* it is being used.

2. Have sufficient relaying to isolate trouble spots.

3. Have your distribution system set up in such a way that somebody in your operating group can control demand.

The use of instruments in the past has been regarded by many plants as a luxury, something that is added to switchgear to run up the price. You wouldn't buy an automobile without a speedometer or the other instruments on your dashboard. They do not actually assist the car in getting you from one place to another. But you can't do without them if you want to keep your car in operating condition and stay out of trouble with the law. Instruments on your power system do the same for you with your power bill.

The photograph opposite shows a control board for a large industrial plant in the South.

The large instruments are recording instruments. These instruments give you a record on a chart of the minute-by-minute power usage on the various feeders, and are of great assistance in planning your operations. Power charts can tell you a lot about your production operations. They can even be used by your industrial relations department to establish work loads and set rates. The other instruments on the board are of the indicating type. They tell you where your power is being used, loads in amperes, voltages, etc.

The large section in the middle of the board is an annunciator panel. When trouble occurs, this panel tells you *where*. In some cases it will tell you *why*. Thus you can correct it in a minimum of time.

What Relays Can Do for You

Relays are gaining in use—as they should—in modern distribution systems. If any feeder, transformer, circuit breaker, or other component of the system gets into trouble, you will want to isolate that trouble without affecting the rest of the system. Relays take care of this trouble for you. In addition, they also protect the equipment to which they are connected.

Distribution systems can be designed with demand control in mind. Pick out the major loads in your plant that can be cut off the line for a few minutes or so in order to reduce the load demand on the whole plant without interfering with production output. It will not make much sense to save $500 in demand charges if by doing so you lose $1000 in production. But there are many places throughout the plant where you can reduce loads or delay putting on new loads for one or two minutes that will not mean a thing as far as your output is concerned.

One plant in New Jersey has installed its demand meter in a laboratory where several electric furnaces are located. Demand is controlled by the supervisor of the laboratory, who schedules his experimental furnace loads according to the loads required in the plant.

In a month or two of operation, you will establish a load pattern that will pinpoint the various times during the day when your maximum demands will occur. These are times you must watch.

As most demand periods are of 15-minute duration, whoever is watching demand has to act quickly to keep it from establishing a new "high." There is where design can help you by circuit arrangements that will enable the cutting off of loads at key points without shutting down vital processes. Once you establish a new "high," you have to live with it for the whole month. Some power companies use this maximum demand for establishing rates on a *yearly* basis. More reason why it may mean money in your pocket to work towards reducing these demand charges.

Energy Charge

The second item in your power bill is the energy charge. This is for kilowatt-hours of power used, and represents the work that electricity does for you. The trick here is to make all this power that you are buying and paying for do useful work for you.

Lighting and power circuits in your system should be designed so that by operating a few switches you can cut off waste. Lighting circuits should be in modules so that you do not have to light up a whole large area just because one or two people are working in a department. Night lighting circuits for off shift and week end when nobody is working in the plant will enable you to cut off the main lighting, and keep it off.

Power Factor Charges

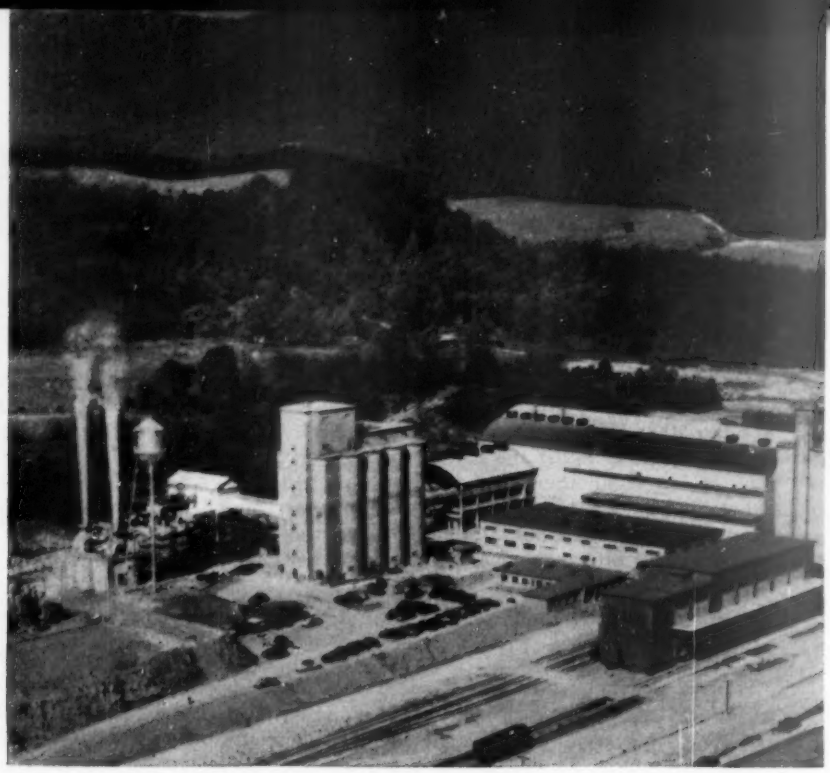
The third item in your bill may be power factor charges. Some power companies do not have such a clause, but others may start at 100%.

A low power factor means that you actually have to take more current from the line to do a certain amount of work. This is reflected in overloaded cables and transformers, bad voltage conditions, and reduced illumination from lighting, especially where incandescent lamps are used. But where it hurts the most is in your power bill if power factor clauses are in force.

How can power factor be improved in plants? You can purchase devices known as capacitors which correct power factor. Better new plants are using them. For your large motor loads, use synchronous motors with 80% power factor correction features.

Another way is to see that all your a-c motors are fully loaded. These motors running at light loads are the cause of bad power factor in your system. As most of your electrical load may be motor loads, here is a *really important* way to improve power factor.

BETTER PLANTS for today's... and tomorrow's... needs



Well-Planned Power

New cement mill saves money by cooperating with local utility, insuring against power failure, and "building in" efficient maintenance

HERE'S A PLANT that has—in more exaggerated form than most plants face right now—the toughest problems that are becoming more general in all types of industry. These are:

1. A rural location remote from a large supply of power at the time the plant was planned.
2. Heavy power demand.
3. A need for a firm supply of power for continuous processes.

Lone Star Cement Corporation's new mill, 20 miles from Roanoke, Va., is right out in the mountains. When the site was picked because of nearness to a source of raw materials—limestone and shale deposits—there were no power lines in sight.

Yet it needs 7500 kva.—far above the average for an industrial plant.

The plant operates 7 days a week, 365 days a year. Any interruption in power will damage equipment and cut production.

Lone Star solved its problem of power supply and in-plant distribution in ways that are almost a model for any new-plant planner.

A SIGNIFICANT PLANT OF 1952-53

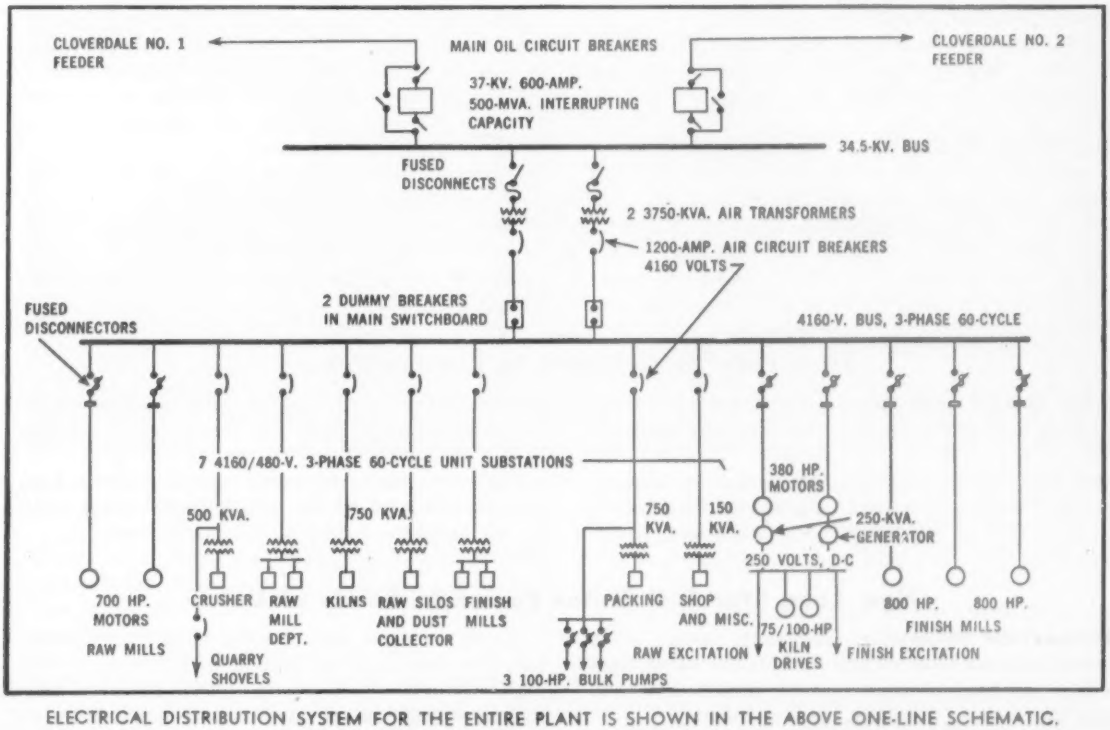
NAME: Lone Star Cement Corp.
LOCATION: Roanoke, Va.

PRODUCT: Cement
EMPLOYEES: 250

ARCHITECT: Lone Star Cement Corp.
BUILDER: Walsh Construction Co.

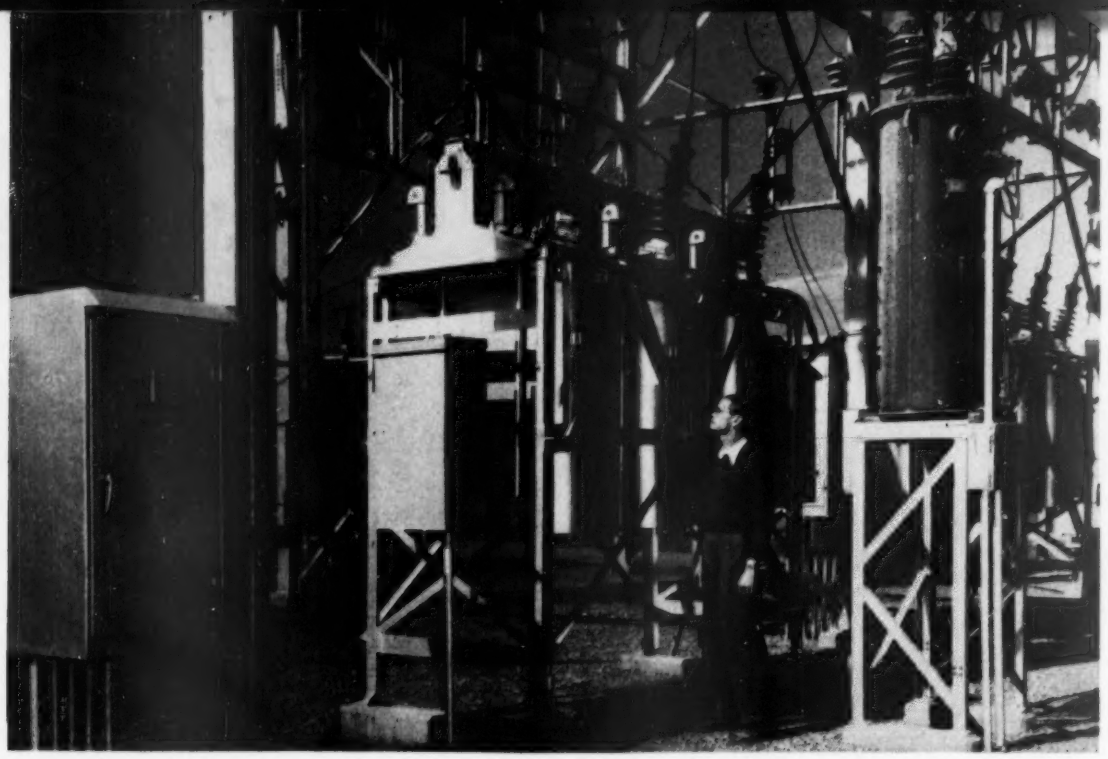
BIG POWER USER IN THE HILLS. This remote location had no power supply when Lone Star Cement Corporation first considered building a plant here. How this problem was solved to the mutual advantage of the Appalachian Electric Power Company and Lone Star is a model example of preplanning and cooperation in electrical distribution.

Distribution Meets Tough Situation



ELECTRICAL DISTRIBUTION SYSTEM FOR THE ENTIRE PLANT IS SHOWN IN THE ABOVE ONE-LINE SCHEMATIC.

FOR DETAILS ON HOW LONE STAR DID IT, turn the page ▶



MASTER SUBSTATION outside the plant has two 3750-kva. transformers to reduce 34,500 volts to 4360 for internal distribution. In center is a 34,500-volt circuit breaker that controls one of the two feeder lines serving the plant.

Begins on page B-216

How Preplanning With the Power Company Paid Off

Realizing the potentialities of the proposed site, the Lone Star people sought the aid of the local power company, Appalachian Electric.

Lone Star was able to tell the utility its immediate power requirements for two kilns and estimate future needs for possibly two more.

CLOVERDALE SUBSTATION · For some time the power company had been planning to bolster its power supply in the area surrounding Roanoke. The big question was where to locate the new substation. Lone Star's need for a demand of 7500 kva. helped decide this question. The new substation was located at Cloverdale, 8 miles from the plant site.

Here a 30,000-kva. transformer reduces 132,000 volts to 34,500. Two feeder lines traveling by different routes carry this voltage to the plant's master substation where they terminate. They also take in a large area for future industrial development.

Thus, by cooperating in the planning stages, both companies benefited. The power company was aided in making decisions on future expansion and the cement company got its power. However, Lone Star received two extra dividends. The two independent feeder lines give them two power sources in case of outages on the power lines, and the utility bought some of the equipment installed in the master substation.

How Plant Is Equipped to Receive Power

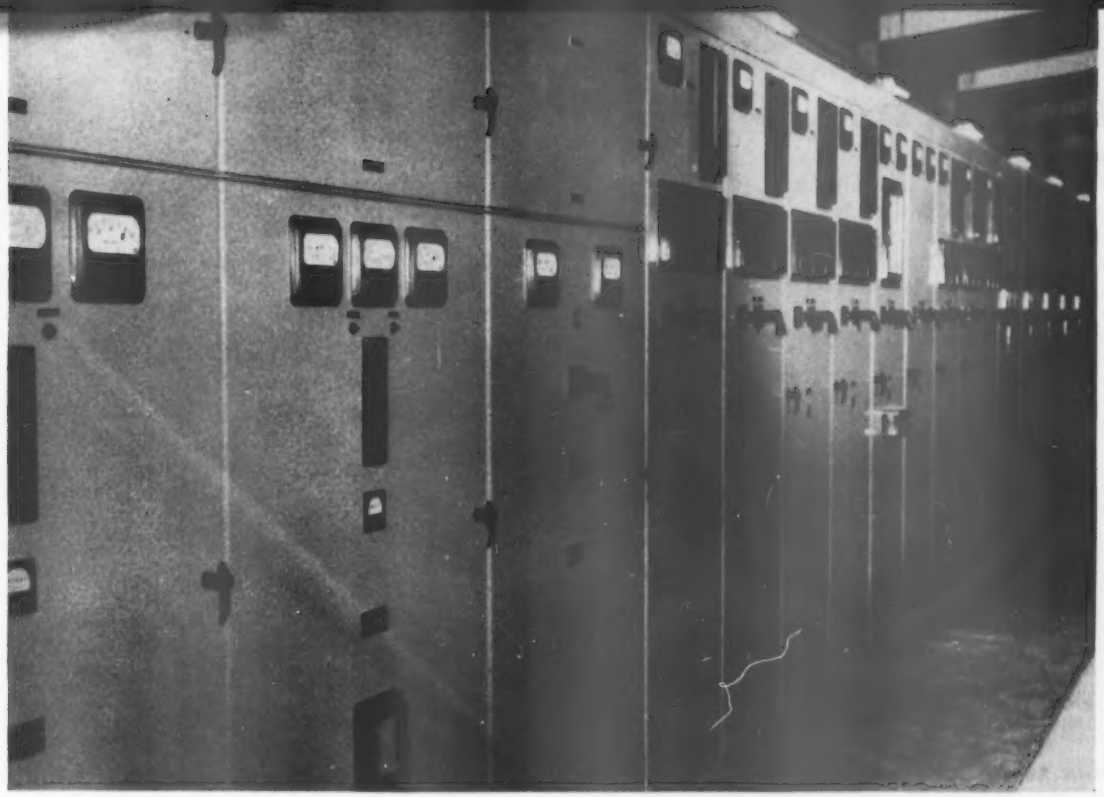
PLANT MASTER SUBSTATION · Because the two feeder lines will provide service to other customers in the future, Appalachian Electric furnished the switching structure and the two main circuit breakers at the plant's master substation. This left it to Lone Star to supply only two 3750-kva. transformers for reducing 34,500 volts power to 4360 for internal distribution, and the disconnect switches for the primary side of the transformers.

Protection against excessive short-circuit currents is afforded by the 500,000-kva.-rated main circuit breakers owned by the power company.

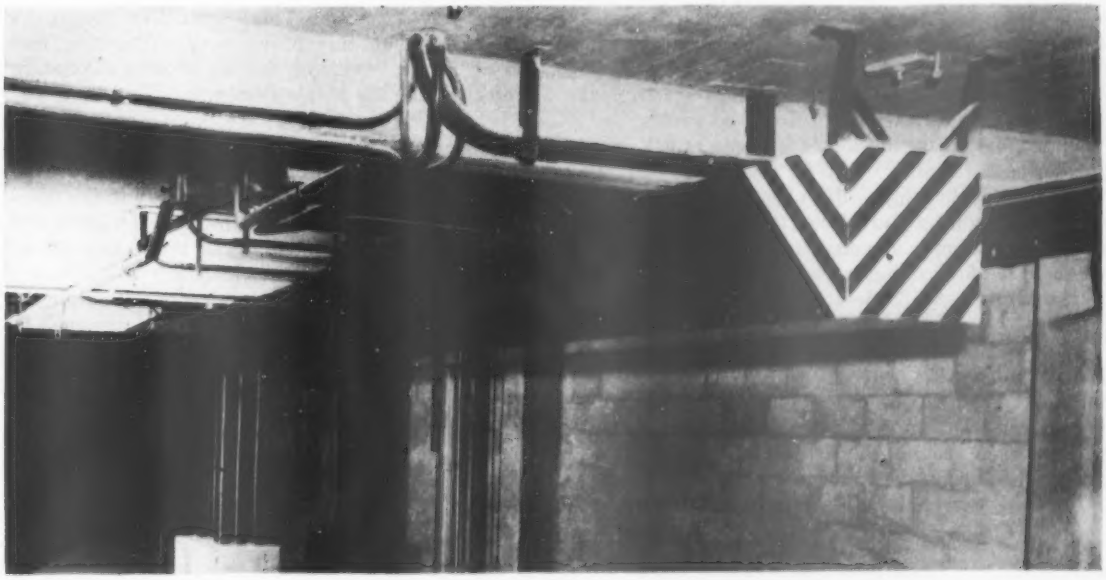
How Lone Star Distributes Power to Points of Use

DISTRIBUTION VOLTAGE · The plant was set up to use 4160 volts. This voltage affords the advantages and economies of high-voltage distribution and also can supply the large motors directly.

To insure 4160 volts on the main plant power bus, the transformers deliver 4360 volts, or 5% higher than that required for plant operation. This higher voltage takes care of any slight drop in



MAIN SWITCHBOARD in main switchgear room of Lone Star's new plant is connected to transformers in the master substation by two underground feeders with two conductors in each leg. Note large number of instruments and relays on panel.



IN BASEMENT BELOW MAIN SWITCHBOARD metal pull-box houses internal distribution cables. It allows easy access for servicing and repairing without entering switchgear and risking entanglement with 4160-volt lines.

voltage on the incoming power supply, as well as voltage drops through the transformers caused by heavy current demands of the 700- and 800-hp. motors driving the mills.

SWITCHBOARD ROOM · Heart of the electrical system for the whole plant is the switchboard room. For this reason it is separated from the main factory area.

The room has filtered air to eliminate dust which might cause extra maintenance. Windows in the wall separating this room from the main factory permit operating personnel to observe the equipment without entering the room. *Turn the page*

MAIN SWITCHBOARD • This unit is connected to the transformers by two underground feeders with two conductors in each leg. In case of trouble in one cable, it can be cut adrift and repaired while the other line carries the load. These cables are protected by two 4160-volt circuit breakers in outdoor compartments in the master substation. The cables feed the main bus in the switchgear through two "dummy breakers."

These "dummy breakers" are really disconnect switches built into circuit breaker compartments. They are of the draw-out type, which means that they can be lowered from their operating position inside the switchgear and taken out of the high-voltage compartment. In this way it is absolutely safe for maintenance men to work in the master substation with no danger of a backfeed from the 4160-volt switchgear.

Under the main switchgear room is a long metal trough which houses the internal distribution cables. This permits easy access to the cables without getting inside the switchgear and risking entanglement with a 4160-volt line.

UNIT SUBSTATIONS • Voltage is reduced from 4160 to 480 for transmission to all motors under 200 horsepower and to the plant lighting transformers at the unit substations. There are seven of these load centers. Five 750-kva. units serve the mill; a 500-kva. unit takes care of the quarry; and a 150-kva. unit is used for the service building.

The unit transformers are of the askeral type so that load centers can be installed throughout the plant without the use of fireproof vaults.

Plant power distribution is straight radial. Two substations, however, can be connected on the 480-volt side to supply the processes that cannot stand any lengthy shutdown. Other stations have means of being connected together temporarily when breakdowns require long downtime repairs. Extra cable is available for such temporary connections.

Wire and conduit are employed to distribute the 480 volts from the unit substations. Loads are too far apart to make the use of bus duct economical. Moreover, since the equipment in a cement plant is not moved around, the feature of flexibility that bus duct allows is not important.

Lighting power is stepped down from 480 to 120 volts by small dry-type transformers. Lighting is incandescent throughout the plant, with the exception of the office, where it is fluorescent.

CONTROL CENTERS • In making cement, many of the processes are interlocked. Because of this, most of the 480-volt motor starters are grouped in control centers. As many as 24 starters of all sizes are in one center. By centralizing control, the maintenance electricians are able to locate trouble easier and quicker. In some locations, the control centers are built into the 480-volt unit substation switchgear. In this way Lone Star doesn't need power feeders to connect control centers and circuit breakers of the 480-volt system.

GROUNDS AND RELAYS • Both the 4160- and 480-volt distribution systems are grounded. This permits selective relaying. Thus ground faults are immediately isolated as they occur, and the trouble-shooting problem is made simpler. The trouble spot reveals itself by the operation of the particular circuit breaker.

Selective relay protection is only as good as the calibrations and settings of the relays. In other words, if a motor gets into trouble, the circuit breaker or fuse protecting that motor should operate first to avoid disturbing other parts of the electrical system.

The power company and Lone Star engineers are working on this problem of calibrating and setting relays. Periodic testing assures maximum protection for the whole system.

SYNCHRONOUS MOTORS • The raw and finish mills are driven by synchronous motors, rated at 700 and 800 horsepower, connected directly to the master substation. The starters for these motors are located in the main switchgear room and incorporated in the 4160-volt switchgear.

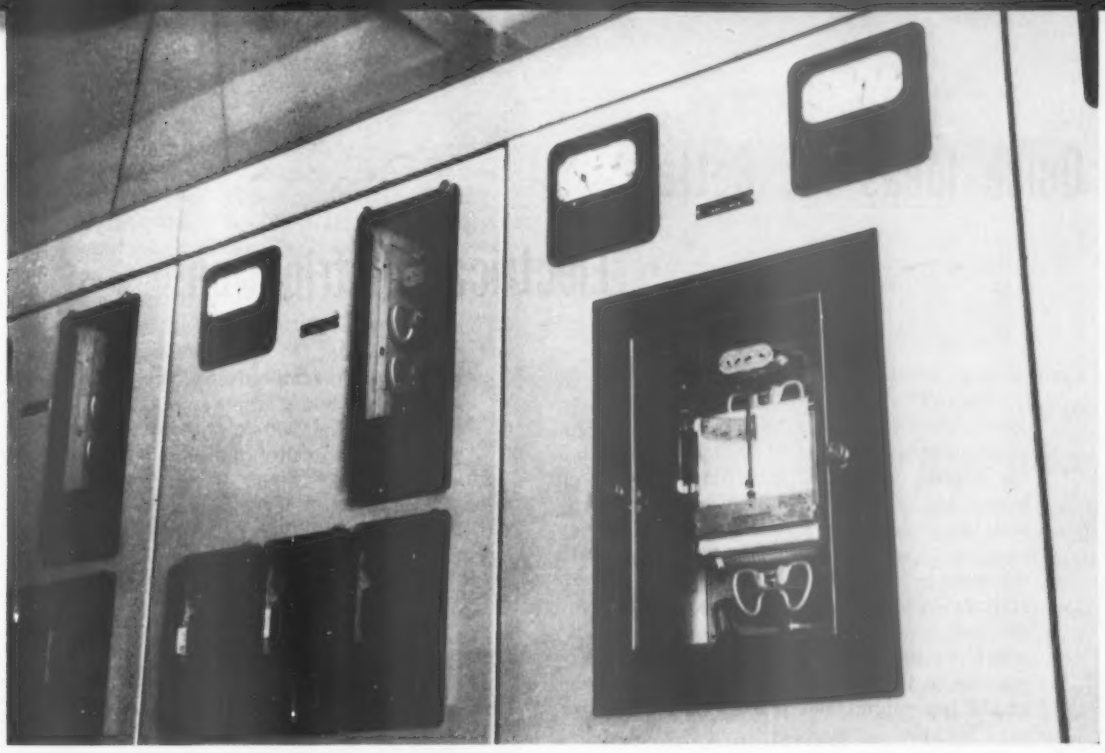
So that these large motors can be interchanged with those in other plants in case of emergency, 4160/2300-volt windings are used. This permits easy hook-up to a 2300-volt distribution system. All synchronous motors are of the 80% power-factor-correcting type. By maintaining the plant power factor above 90%, maximum benefit of the power factor clause in the rate contract can be obtained.

How and Where Plant Uses D-C Power

Two motor-generator units located in the main switchgear room supply direct current for the mill. Driven by 380-hp. motors, the sets are rated at 250 kw. for 250 volts d-c. They are fed directly from the main 4160-volt switchboard.

The d-c is used to drive the huge cylindrical kilns, which are 10 feet in diameter and 340 feet long. Sloping 7/16 inch per foot, the kilns have a refractory lining 6 inches thick to withstand burning temperatures of 2700 F. The need for continuously adjustable speeds dictated the use of d-c motors to rotate the cylinders at 40 to 50 revolutions per hour.

Although two units are available, only one set is required at one time for normal supply. Each unit is run for 500 hours, then shut down for inspection and maintenance while the other unit carries the load. In addition to supplying the power for the kiln drives, d-c is also used to excite the fields of the large synchronous motors.



INSTRUMENTS SHOW POWER SITUATION. Total plant power is plotted on demand meter (right) in main switchboard. Long rectangular meter (upper left) records unit substation power consumption. Figures are used for cost data.

How Lone Star Uses Instrumentation for Efficiency

The plant has extensive instrumentation because:

1. The accounting department needs power consumption figures to compute costs accurately.
2. The central office wants the figures for month-to-month and plant-to-plant comparisons.
3. The efficiency of operation of various pieces of equipment is based on these data.

You can't use instruments for these purposes unless your distribution system is planned the right way. Since the Lone Star system is divided by departments, it is possible to obtain departmental consumption figures by measuring the output to the unit substations feeding each of the departments in the plant.

How Plant Is Kept Clean Despite Dusty Process

With a manufacturing process that produces plenty of dust, housekeeping is naturally a problem. Every machine, hopper, and silo at Lone Star is kept under suction to prevent dust from getting out. This not only helps with the housekeeping but also reduces raw materials losses.

Another notable feature is the dust filtration of kiln gases. They pass through a dust collector and an electrical dust precipitator. The collector eliminates heavier elements, the precipitator removes very fine particles. All dust is returned to the feeding system.

How Special Materials Handling Problems Were Licked

The handling of materials in any cement plant is a big job. For cleanliness, the handling system must be especially designed.

Many engineers may express surprise at the extensive use of drag conveyors at Roanoke. Belt conveyors cost less to operate, so have been widely used in the industry.

But Lone Star engineers consider belt conveyors a constant source of spill, requiring too much clean-up. The drag conveyors in the new plant have tight covers. No material gets out in transit. One small dust-pipe connection underneath the drag conveyors keeps the entire system clean. This means fewer cleaners on the job.

Finished cement is pumped in a dry state to silos for bulk shipment or to await packaging. Because 65% is shipped in bulk, some silos load freight cars directly.

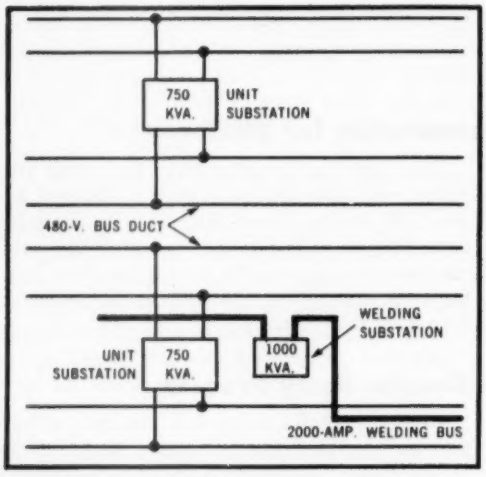
In the silos, bulk pumps are on tracks for easy movement. Complete flexibility of piping, valves, and hose switches enables cement from any silo to be delivered to any packing or shipping point.

At Lone Star, cement goes where it should—into the shipping container instead of on the floor.

Quick Ideas for Better...

Electrical Distribution

Good voltage control was needed at Kaiser-Frazer Corporation's new Dowagiac (Mich.) engine plant. Precision machine tools and welding equipment with fine electronic controls called for holding voltage within limits of plus or minus 1%. So K-F installed load-ratio control on main transformers. This device changes taps on transformers to compensate for voltage changes. Selector switch has 33 stations—enough to give adequate range for normal conditions. Indicators tell highest point reached on each side of normal. According to the counter on the control device, 14,857 tap changes were made in a period of nine months.



Welding equipment pulls heavy current from your power distribution system for short intervals. When that happens, voltage drops, causing control trouble, flickering lights, and loss in motor output. Cutler-Hammer, Inc., in its new Milwaukee plant, kept welding loads from interfering with the normal power supply by installing a separate substation to handle welding demands. The 1000-kva. substation distributes welding power on a separate bus-duct run at 2000 amperes. Normal 480-volt power comes from two 750-kva. substations, each feeding four 490-amp. bus-duct runs.

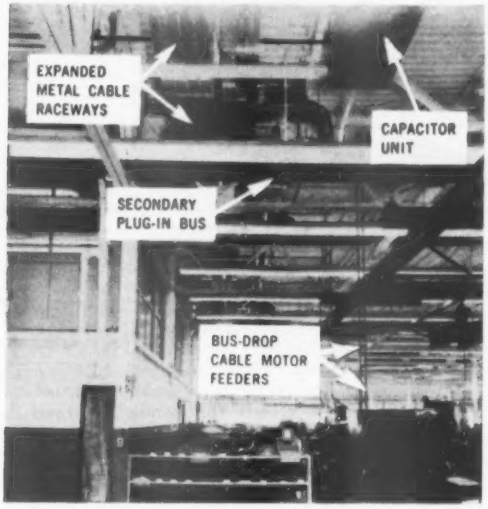
You can save cable-installation time with flexible, interlocked, armored cable instead of conventional conduit and cable. Savings ran 50% and even more at Kaiser-Frazer's Dowagiac plant, where armored and conventional cable were used under the same conditions. For example: An 800-ft. heavy power feeder passed through three buildings and over roofs of two more. It had eleven 90-deg. and six 45-deg. bends. Seven men, a foreman, and a lift truck installed armored cable. Pulling time: 35 minutes. Ordinary cable would have required splicing plus bending and installing of conduit.

Unusual power distribution is needed for testing machine tools powered by motors and controls with many different voltages and frequencies. Solution at Monarch Machine Tool Company's new Sidney (Ohio) plant is plugboard power distribution system. Numbered plug-in receptacles carry any combination of 3-wire, 3-phase or 4-wire, 2-phase alternating current (25 to 60 cycles and 150 to 750 volts) to floor outlets at assembly stations. They also carry wide range of direct current to 100 lathe-testing stands. Thus special machines, requiring special testing power, need no special assembly locations, can be assembled anywhere.

Putting substations above manufacturing areas protects them from damage, saves manufacturing space. At the new Delco Products Division plant in Dayton, substations occupy top level of three-level island in center of each manufacturing quarter. Toilets are on first level, supervisors' offices on second. Substations are rated at 1500 kva. They have dry-type transformers, nitrogen-filled to make them

fireproof. Their location makes it easy to reach them with high- and low-voltage cables from roof trusses.

Hatchways over stairwells simplify moving of equipment into and out of elevated substations. Stairs are on main aisles. Thus machines can't block openings by being installed under hatchways. Sounds unimportant. But taking equipment out of your substation, only to find a boring mill or some other piece of machinery in your way, could make you think otherwise.

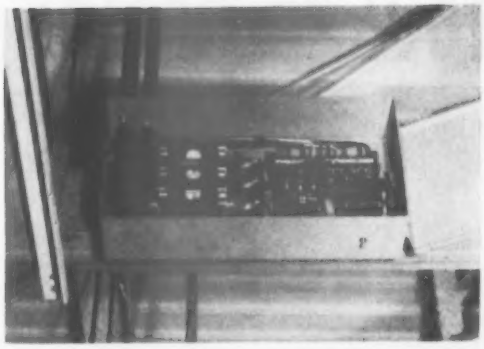


A flexible bus-duct system distributes 480-volt power to machine tools at the new Delco plant. Cable runs connect plug-in bus duct to switchgear in four unit substations. Runs are made of expanded metal raceways. They drop down to tap-ins on bus duct runs. Cables are easy to add to, or remove from, raceways. They actually carry more current than in conduits because expanded metal permits escape of heat, which would be trapped in conduits. Bus-duct runs also have insulated joints, which permit sectionalizing—certain sections of duct can be connected to either of two substations if shift in plant load overloads one substation.

Two-way job is done by lighting fixtures in Delco's new plant. High intensity — 80-foot-candle minimum—is needed on the manufacturing floor. But the ceiling wasn't neglected either.

All of the building services and utility lines are above the lighting fixtures, so maintenance men have to work in this area. Delco's fixtures throw 20% of the lamp output up toward the ceiling, with only a 1% loss in the downward output.

Letting light escape upward through slots in the reflectors yields another dividend. Lamp heat, escaping through the slots instead of



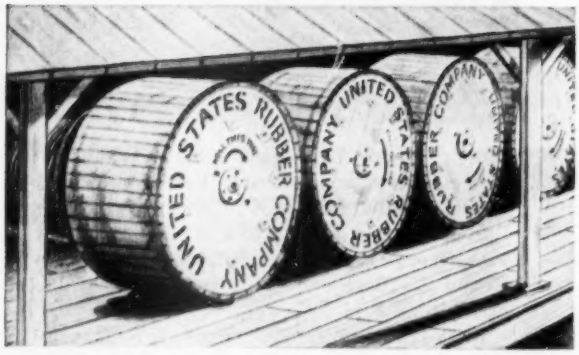
swirling under the reflectors, keeps the reflectors cleaner than with no slots. It's expected that the vented fixtures will retard the collection of dirt on the reflectors to such an extent that group lamp replacement and fixture cleaning will be done simultaneously in 80% of the plant.

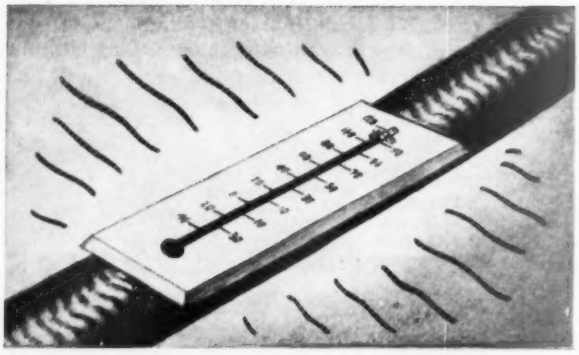
Installed in continuous strips on 10-ft. centers, the fixtures are 15 feet above the floor. Power to the lights is fed from the bus duct at 460 volts. The 460-volt system eliminates stepdown transformers, multi-circuit lighting, heavy feeders to panels, and heavy branch feeders. Lights are controlled by contactors plugged into the bus duct, as shown in the photo above. Practically all conduit is eliminated because the wiring is run in the fixture channel.

The installed cost of the 460-volt system in the first 400,000 square feet of floor space was considerably below the cost of a comparable 120-volt system.

To switch alternating to direct current quietly, use power rectifiers. They're quiet as well as efficient—have no moving parts except small pump. Photograph shows rectifier in maintenance superintendent's office at electrical manufacturing plant. This is no place for motor-generator set getting same amount of d-c power for plant. Noise would drive men crazy.

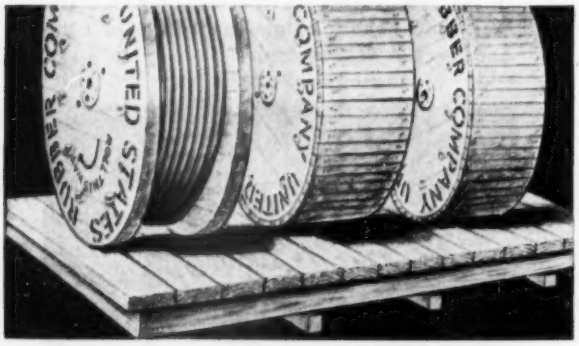
How to prolong the life of wire and cable by proper storage

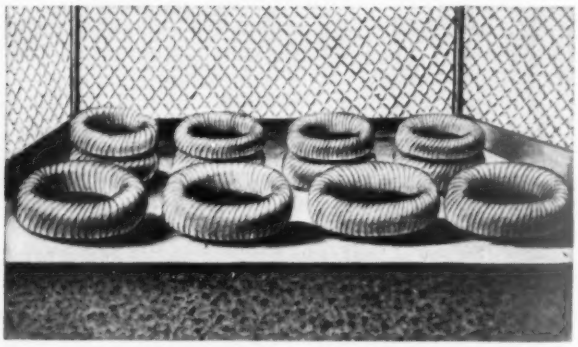




1 **Protect cables from the weather.** Moisture is especially injurious to fibrous coverings. When stored out-of-doors, if they become wet and then freeze, they will be weakened and the saturant will flake off. In humid weather, mold growth is accelerated, weakening the covering and making it easier to damage the cable during installation. (Rubber and thermoplastic insulated and jacketed cables may be stored under moderately humid conditions.) The larger sizes of fibrous covered and rubber jacketed cables and all lead-sheathed rubber insulated cables must be stored on reels which must be properly lagged—or the cable must be otherwise suitably protected against mechanical damage. Reels can be stored out-of-doors if the cable is protected against sun and weather, and the ends are properly sealed.

2 **Don't expose wires and cables to extremes of temperature.** Chemical reactions occur at a higher rate at high temperatures than low. The greatest deterioration of low-voltage cables is due to chemical changes, oxidation or internal changes in the compound itself. Never store reels in the boiler room unless you use a fan to blow hot air away from the wires and cables. It's best to store cables at room temperatures indoors out of direct sunlight. Rubber insulated cables may be stored and handled without damage at the lowest temperatures ordinarily encountered, but thermoplastic synthetic insulated cables should not be handled at temperatures below –10 C. (14 F.)





3 **Reels should be kept off the ground,** so that moisture will not harm the cables, reel flanges and lagging. Sound reels are easier to handle and there is less chance of injury to the cable as it is removed from the reel.

4 **Coils should be stored one layer deep on the floor or shelves,** with the axis either horizontal or vertical. To save space, they may be stacked, but not more than 5 coils in height—otherwise there is harmful pressure on the insulation. Don't remove brown paper or box that protects against dust and light until used.

5 **Rubber insulated fibrous covered, rubber jacketed or lead-sheathed cables in storage** should never be bent to a diameter less than I.P.C.E.A. recommended diameters. Never let coils or reels drop more than a few inches. Always roll a reel in the direction indicated by the arrow on the flange. When rolling an unlagged reel, put planks under the flanges to avoid pressure on the cable. Coils, reels and spools should always be rotated when wire and cable is removed to avoid twisting the cable.

FREE REPRINTS OF THIS PAGE ARE AVAILABLE. WRITE TO ADDRESS BELOW.

UNITED STATES RUBBER COMPANY

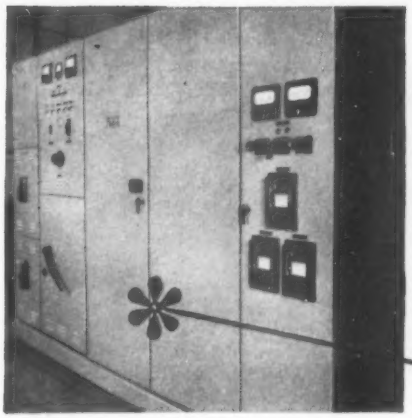
U.S.RUBBER
SERVING THROUGH SCIENCE

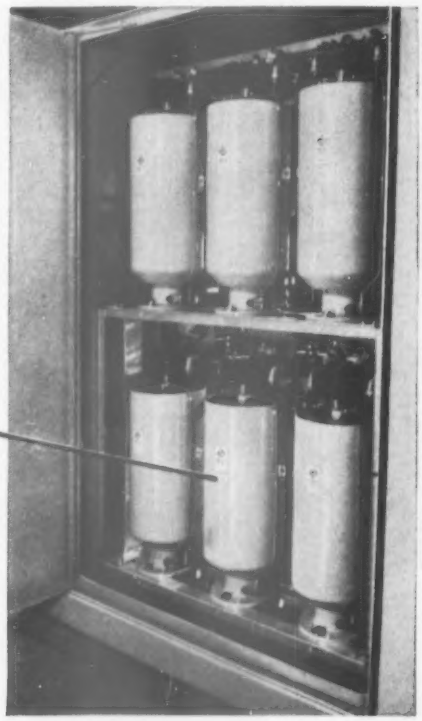
Electrical Wire and Cable Department

ROCKEFELLER CENTER • NEW YORK 20, NEW YORK

Don't build around obsolete DC supply

—RETIRE IT NOW!





Modern Allis-Chalmers factory packaged, sealed tube, 500 kw mercury arc rectifier as installed in midwestern industrial plant. Left: "dead-front" compartments for dc feeders, dc metering and cathode breaker, rectifier tubes, and ac control and metering. Right: interior view of mercury arc rectifier tube compartment.

NOW IS THE TIME to retire obsolete converting and generating equipment. As operations expand, this inadequate equipment will become a growing handicap.

Now too — while there is a favorable base for amortization — is the time to consider mercury arc rectifiers for your expansion plans. Let Allis-Chalmers show you how the *modern* mercury arc rectifier can improve your direct current service.

LOW MANPOWER REQUIREMENT. With push-button starting and no synchronizing required, attendants are not needed during normal operation. Downtime for maintenance is reduced with no moving parts to lubricate or wear.

LOW COST OPERATION. Conversion efficiency is higher at all loads with large power savings during light load periods.

CONVENIENT INSTALLATION. Factory packaged, light in weight, and requiring no special foundation, Allis-Chalmers mercury arc rectifiers may be placed right at the load center.

IMPROVED PLANT OPERATION. With dc load center installation, distribution distances are cut, dc feeder losses are reduced, and full voltage is available at production equipment.

Whatever your specific direct current needs, Allis-Chalmers builds suitable and truly modern mercury arc rectifiers to meet them.

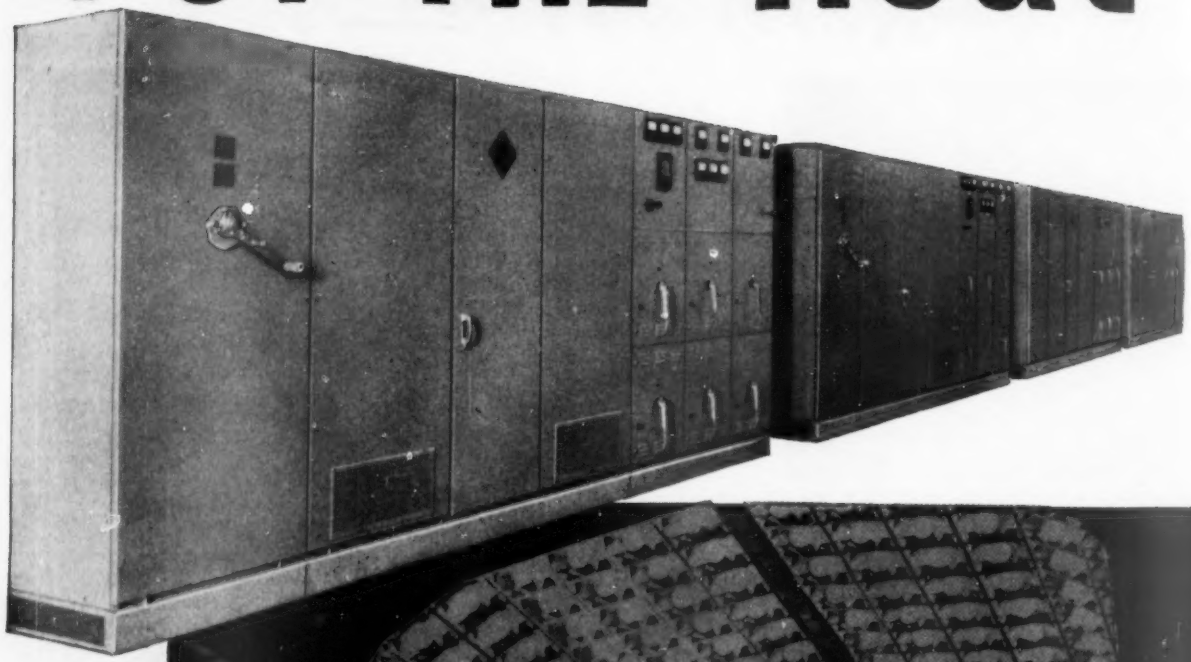
Sealed tube rectifiers (as shown above) are supplied in ratings from 200 to 1000 kw for lighter duty service. These are commonly used in large buildings, industrial plants and electric haulage systems. Pump evacuated rectifiers are built from 750 kw to the largest ratings required for heavy duty applications.

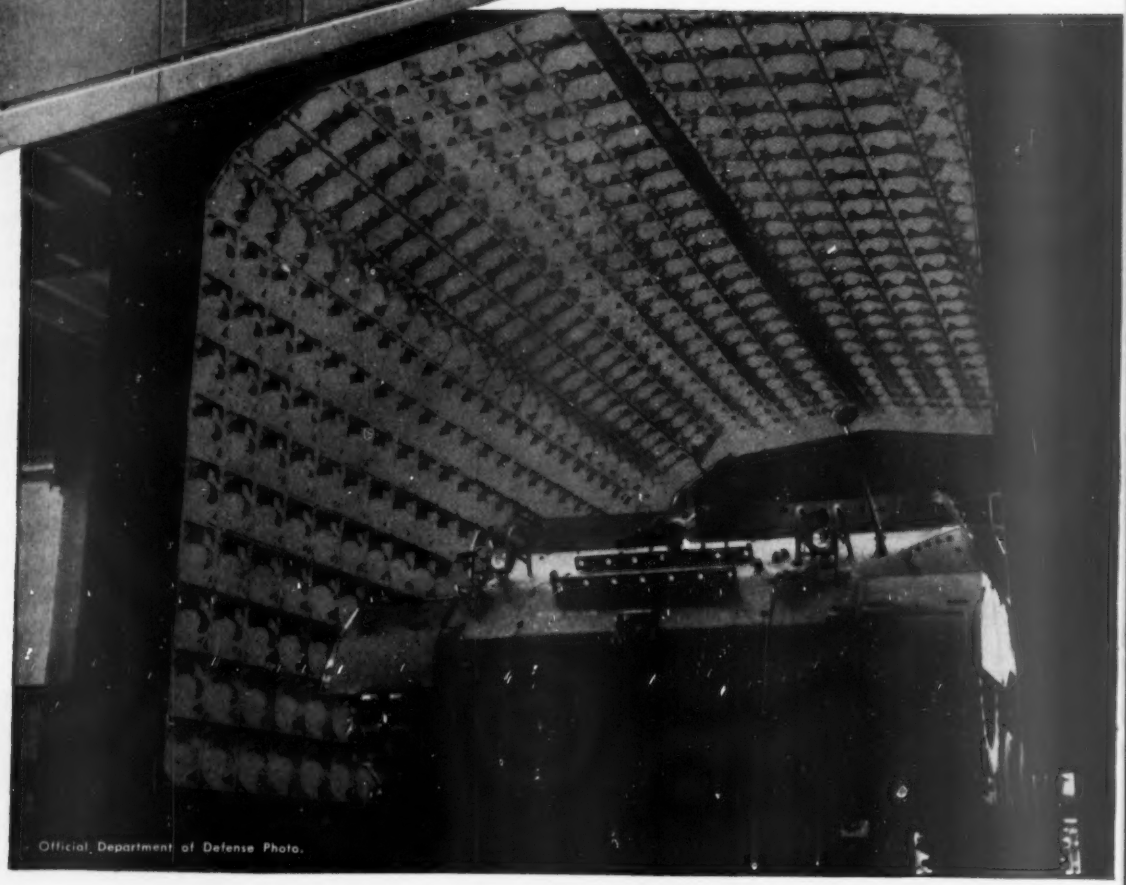
An Allis-Chalmers representative will be glad to explain in detail how these modern mercury arc rectifiers will improve the operation of *your* direct current system. Call your nearest A-C office or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A-3467

ALLIS-CHALMERS A-C

MERCURY ARC RECTIFIERS

ALLIS-CHALMERS PUT THE "Heat"





Official Department of Defense Photo.

UNIT SUBSTATIONS

ON PRODUCTION!

YOU CAN INCREASE the production of your plant without adding production equipment or hiring more help . . . just eliminate undervoltage. Motors, lights, heating units—all electrical equipment gives top performance only when operated at full voltage.

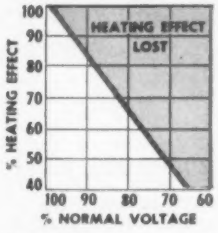
Paint baking or drying operations take longer when voltage drops. For example, a 10% drop reduces heating effect of infra-red lamps 19% . . . slows production. One paint drying operation required 63% more time when voltage dropped 10%.

A major cause of undervoltage is long, heavily loaded 480 volt feeders. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables. Performance of all electrical equipment will improve . . . and personnel efficiency will increase because of better illumination from existing lighting fixtures.

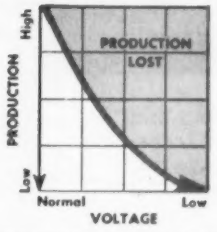
You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install and provide protection to personnel. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3372

LCS Unit Substations

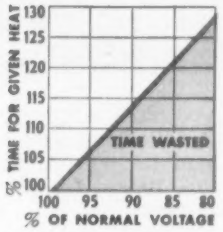
HOW UNDERVOLTAGE WASTES MANHOURS . . . CUTS PRODUCTION



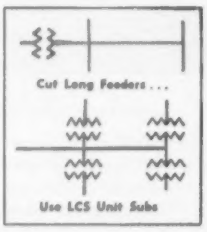
FULL OUTPUT from existing equipment demands full voltage. Heat output of infra-red lamps (used for baking paint on metal, drying coils of electrical apparatus and similar applications) drops with undervoltage. Output of resistance furnaces also drops off as the square of undervoltage.



PRODUCTION LOSSES RESULT from undervoltage. In one case a 10% drop in voltage cut the output of an infra-red drying oven from 1500 pounds per hour to 1275. Undervoltage means less work done each day . . . greater overhead for the work done, more manhours to be figured into every job.



TIME IS WASTED when undervoltage is distributed to infra-red bulbs and other heating devices. It takes longer to deliver the same amount of heat . . . longer to do a given job. In one plant, drying time for black painted sheet steel increased from 11 to 18 minutes by a 10% drop in voltage.

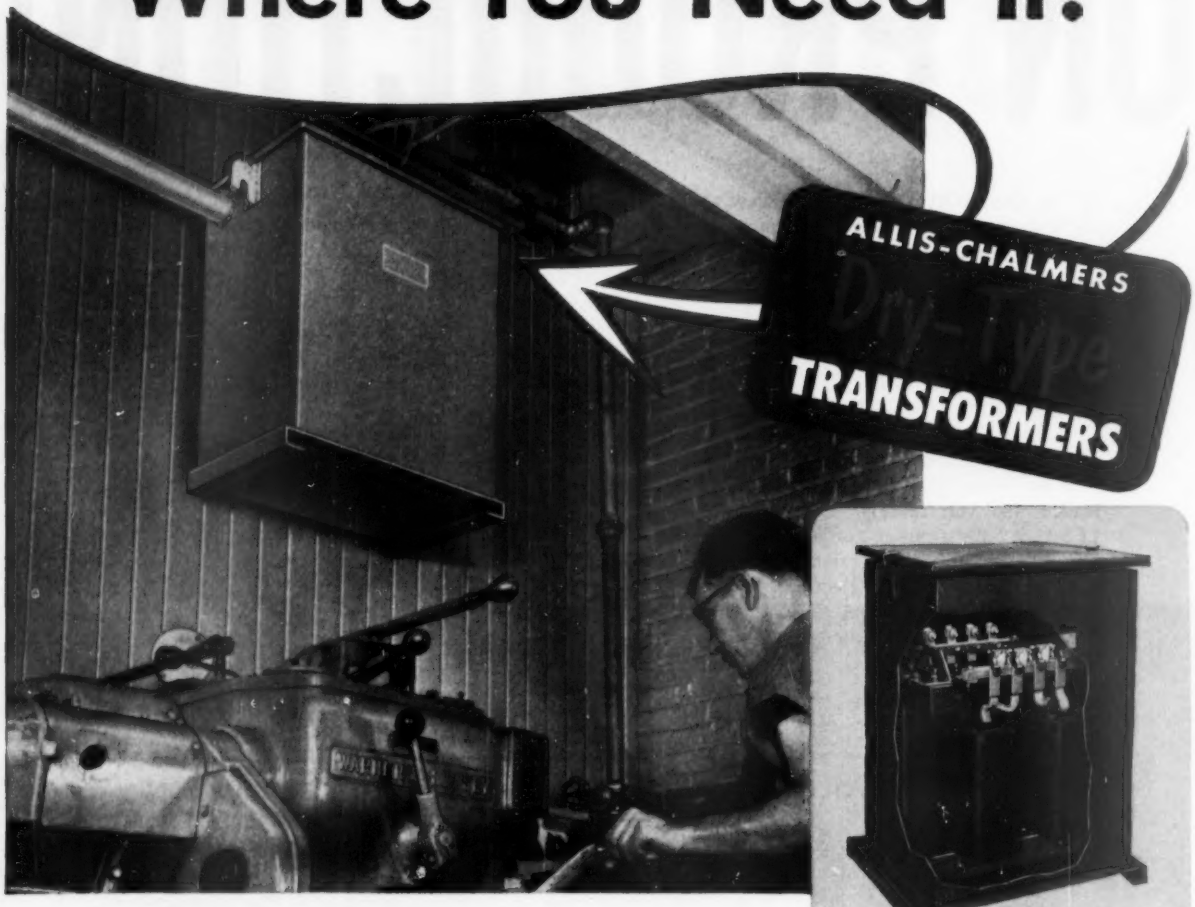


A MAJOR CAUSE OF UNDERVOLTAGE is voltage drop in secondary feeders. Long low voltage lines may prove inadequate as production schedules are stepped-up and new machines added. Install substations at load centers to cut feeder length, reduce voltage drop and increase production.

ALLIS-CHALMERS

A-C ALLIS CHALMERS

PUT POWER Where You Need It!



HERE'S THE WAY to assure rated voltage for motors and other equipment. Install Allis-Chalmers dry-type transformers close to the load to provide full voltage for efficient motor operation, flicker-free lights, and full heating of thermal equipment.

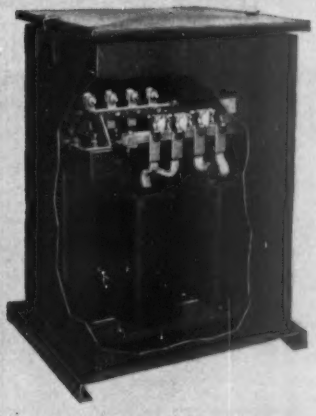
You can mount them anywhere, on posts, beams or walls, in a small amount of space, or right on the machine itself. You don't need vaults or expensive enclosures.

Installation is easy because junction boxes are eliminated. Knockouts are provided for connecting conduits directly to the transformer case. System cables are connected to the transformer terminals in compartments.

Maintenance is easy, too. You install Allis-Chalmers transformers and forget them except for periodic inspections. There are no insulating liquids to maintain; no gauges or gaskets to fuss with.

Get more information from your Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wis.

A-3980



IT'S ENDURANCE BUILT

Core and coil assembly is impregnated to guard against moisture and dirt. All-welded, modern looking case protects the internal assembly. Case is Spra-Bonderized to protect it against corrosion. Three coats of baked-on alkyd resinous paint furnish additional protection.

Ratings 167 kva and smaller (single phase); 300 kva and smaller (three phase); 600 volts and below.

ALLIS-CHALMERS

safe electrification for HEAVY DUTY CRANES and HOISTS

FEEDRAIL® Moving POWER SYSTEMS

capacities up to 500 amperes.

No longer need your Crane and Hoist wiring endanger workers or be a potential fire hazard to your plant. The new Heavy Duty Feedrail trolley busways give you the *safe* way because:

1. **They are a built-for-the-purpose system, designed and constructed *expressly* for high amperages.**
2. **All current carrying conductors and trolley contacts are protected every inch of the way.**

But, maximum safety is only one advantage you get from Heavy Duty Feedrail. The system — accurately, ruggedly constructed — fits into your specific application requirements, its standardized components making for an easy installation. And, you'll find its low maintenance, long life and continuous dependable service are economy factors in plant operation.

write for HEAVY DUTY Catalog No. 30.

Tells you all about this new Heavy Duty system of electrification, including installation planning and specifying data. Like this catalog . . . engineering cooperation is always available . . . without any obligation.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

Throughout industry, flexible Feedrail systems, in capacities from 60 to 500 amperes, provide convenient movable power sources for production, testing and materials handling. These can serve you in:

- Cranes and Hoists
- Production Lines
- Conveyor Assembly Lines
- Moving Test Lines
- Portable Tools
- Machine Tools
- Cutting and Sewing Rooms
- Lighting
- Motor Control

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 Barclay Street, New York 7, N. Y.

53-1

for PRODUCTION efficiency of your POWER SUPPLY

When building or remodeling a plant, careful thought is given to plant layout so that the ultimate can be achieved in both efficiency and production. Production flow charts, showing the proper materials handling procedures and fabrication processes and their efficient power supply are all considered in blueprint planning.

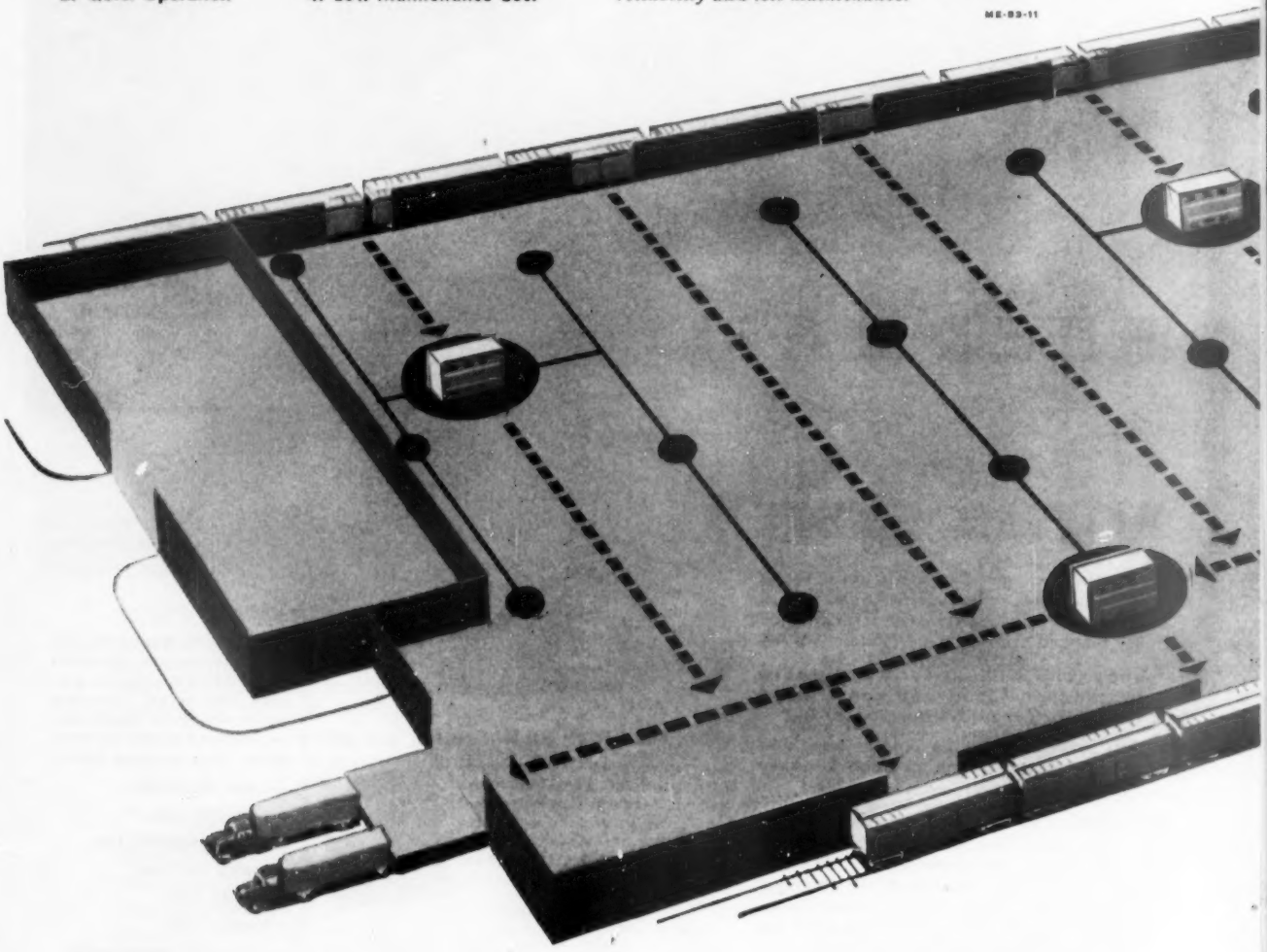
Such consideration would reveal the following features of prime importance for power supply

1. Location Flexibility
2. Quiet Operation
3. Efficient Operation
4. Low Maintenance Cost

Moloney Dry-Type Transformers will provide these features assuring you of an uninterrupted power flow under all operating conditions. Moloney Transformers also help to maintain higher levels of production efficiency for workers because of their quiet operation.

It would be wise to consider all these facts when selecting the Dry-Type Transformer to supply your power needs. If you do this, your choice will probably be Moloney . . . the transformer that gives *better performance* with *greater reliability* and *less maintenance.*

ME-53-11



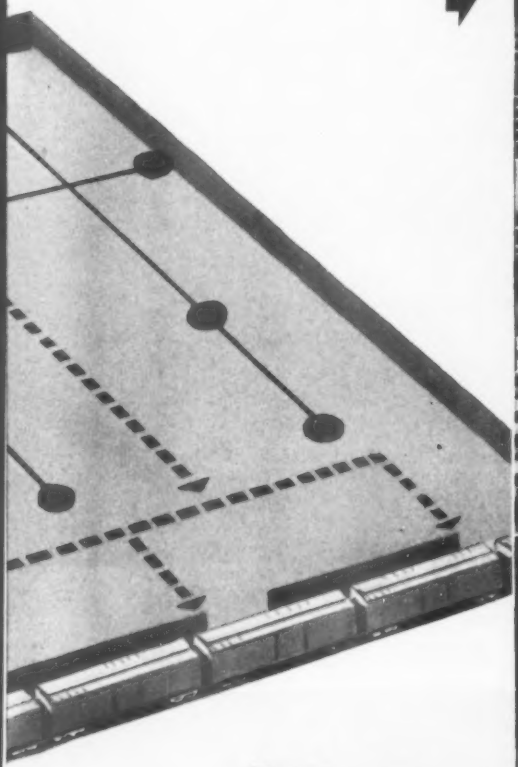
M O L O N E Y E L E C T R I C

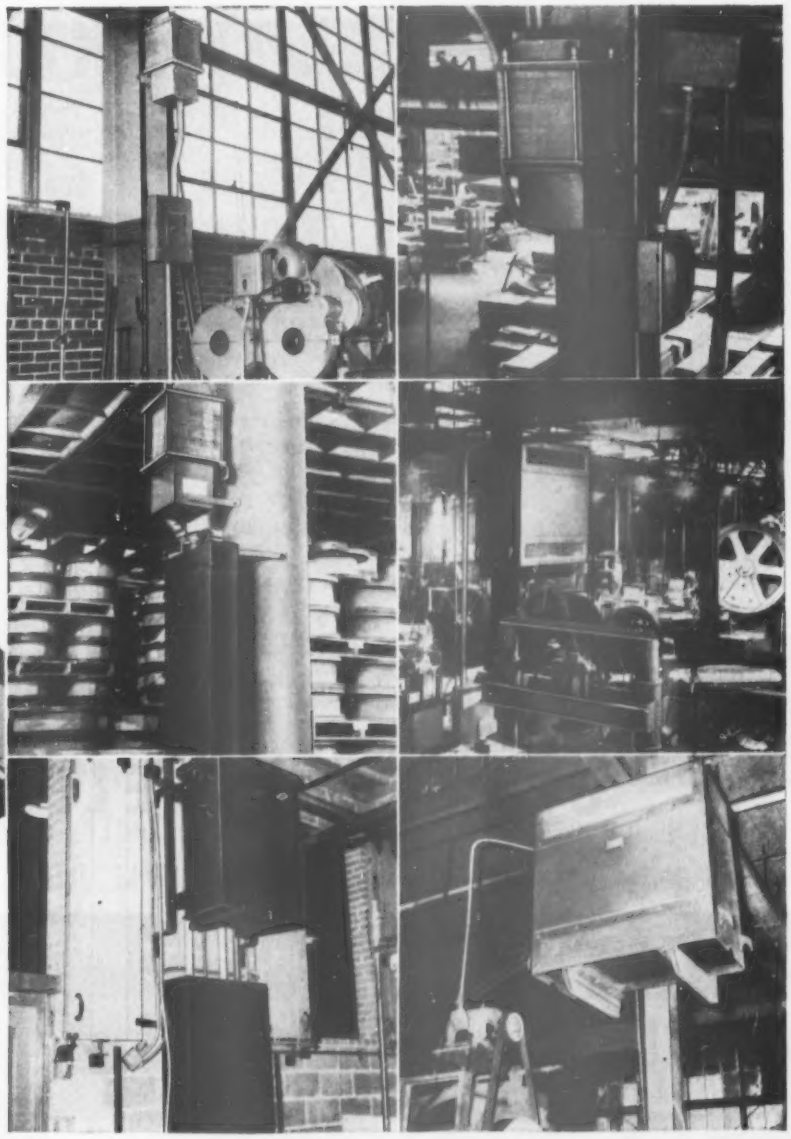
Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers

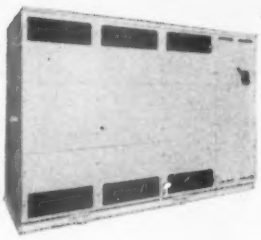
SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS

EFFICIENCY check the ... Specify MOLONEY!

Typical installations showing how Moloney Dry-Type Transformers are readily located at the most convenient point along the production line.







Moloney Dry-Type, Air-Cooled Transformer. Primary voltages range up to 15,000 volts, and sizes to approximately 3,750 Kva. Class B insulation (80° C. rise) is used.

C O M P A N Y

Step Voltage Regulators • Unit Substations

MISSOURI AND TORONTO, ONT., CANADA

MOLONEY ELECTRIC = { BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

VOLUME III, NUMBER 5 • MAY, 1953

Introducing...

A NEW LINE OF AIR CIRCUIT BREAKERS

THREE NEW BREAKERS have been added to the line of General Electric Type AK breakers. This means that the AK line can be secured in interrupting ratings from 15,000 to 100,000 amperes.

SELECTIVE OPERATION up to full interrupting rating is now provided by triple-characteristic tripping devices which open the breaker to isolate a fault.

STORED-ENERGY CLOSING MECHANISM in new breakers gives safer, positive closing even against fault conditions. Closing is accomplished by energy stored in a sturdy closing spring even if control power is lost.

MULTIPLE CONTACTS give faster arc extinction, longer contact life and reduced maintenance.

INTERCHANGEABLE PARTS between breakers greatly reduce parts stocking problems. The main physical difference between breakers is the number of contact fingers which increases with rating.

COMPLETE NEW LINE OF DRAWOUT EQUIPMENT having whatever circuit pattern required, can be manufactured for shorter shipments by using standard circuit breaker compartments.

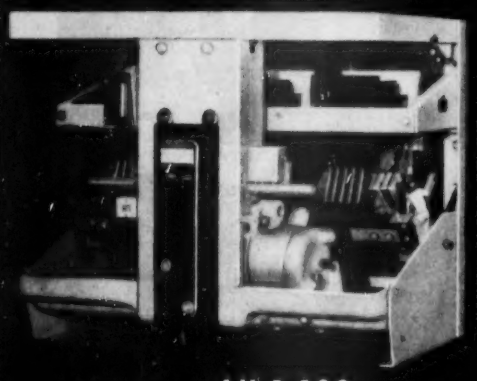
READILY ACCESSIBLE CURRENT TRANSFORMERS can be changed without disturbing bus connections.

INTEGRAL RACKING MECHANISM on removable unit cuts maintenance expenses.

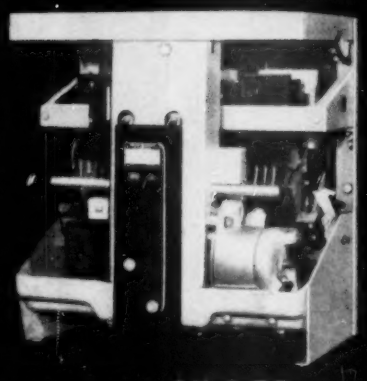
For full information, ask your local G-E sales representative for Bulletins GEA-5915 and GEA-5916 or write to General Electric Company, Schenectady 5, N. Y. 873-1

GENERAL ELECTRIC

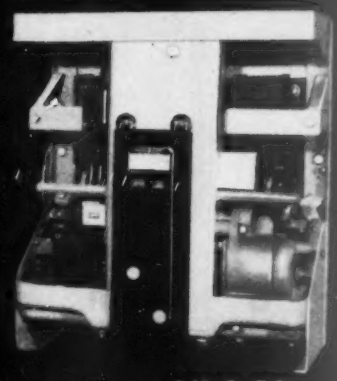
600 volts A-C 250 volts D-C



New Type **AK-1-100**
Rated: 4000 amps
100,000 amps interrupting



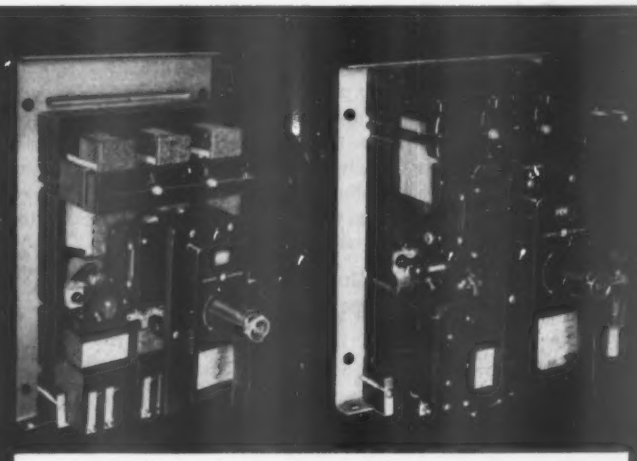
New Type **AK-1-75**
Rated: 3000 amps
75,000 amps interrupting



New Type **AK-1-50**
Rated: 1600 amps
50,000 amps interrupting

1878 75 1953
YEARS OF ELECTRICAL PROGRESS

NOW, FOR THE FIRST TIME 30-cycle momentary ratings equal to full interrupting ratings permit selective operation under all conditions.



AK-1-25 and AK-1-15 Breakers, introduced in 1948, complete the line with ratings of 600 and 225 amps, interrupting ratings of 25,000 and 15,000 amps.

New line of drawout enclosures, designed for AK breakers. Now, for the first time, a line of breakers specifically designed for drawout equipments.

Simplify Testing with Newest G-E Instruments

TWO NEW RANGES PERMIT WIDER APPLICATION

1 Motor Starting Current Measured With NEW AK-1A Volt-ammeter

Now, with new pointer stop and additional voltage and ampere ranges, the new AK-1A hook-on volt-ammeter is an even more versatile a-c testing instrument. The pointer-stop permits reading of motor starting currents. You can use your AK-1A volt-ammeter for spotting overloaded feeders, open fuses, and improper operation of circuit breakers.

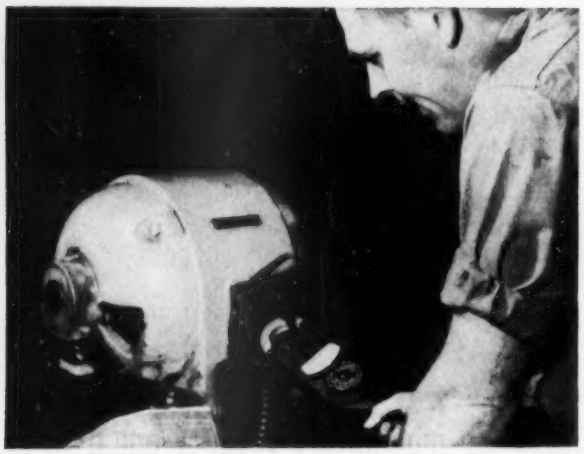
Ranges: 0-7.5/30/75/300/750 amperes
0-150/300/750 volts

Accuracy: ±3% full scale.

Extra-sturdy construction assures years of service.

Weight: 3½ pounds.

PRICE $66.74*



KILOWATTS ARE CHECKED IN OVERLOAD AREAS

2 Check Kilowatts Directly With Compact AK-2 Hook-on Wattmeter

Both single and polyphase circuits can be measured quickly and easily with this hook-on wattmeter. Ideal for trouble-shooting power surveys and load tests, this instrument can be used to make sure that motors operate at rated capacity. In addition to measuring kilowatts, this AK-2 hook-on wattmeter will measure vars in balanced three-phase circuits.

Ranges: 0-3/6/20/60/200/300 kw
15-600 amperes
100-600 volts

Accuracy: ±5% full scale

Weight: 4 pounds.

PRICE 95.53*

AK-3 SIMPLIFIES CAPACITOR INSTALLATION

3 Spot Power Losses Easily With Type AK-3 Power-factor Meter

This new hook-on power-factor meter enables you to measure power factor without interrupting service. The AK-3 can be used on any balanced 3-phase circuit. When making capacitor surveys, you'll find the hook-on power-factor meter a valuable time saver. Improved power factor means relief to overloaded feeder circuits and transformers.

Ranges: 100-600 volts
15-600 amperes

Accuracy: 0.05 PF

Weight: 4½ pounds

PRICE 95.53*

4 Quickly Determine The Phase Sequence of Polyphase Circuits

A handy, pocket-sized phase sequence indicator for determining the phase sequence of polyphase circuits is designed to save time for construction and maintenance men, trouble shooters, test men, and engineers. To use—merely connect the three leads to correct voltage terminals; one lamp will glow to show the direction of phase sequence.

Ratings: 120/240/480 volts or
120/240/600 volts

Weight: only 22 ounces

Dependable: has no moving parts or fragile filaments.

PRICE: $28.14 OR $31.77*

TO OBTAIN READING SIMPLY CONNECT THREE LEADS

5 Lighting Circuits Easily Measured By High Accuracy AC Portable

Used for both testing and maintenance work these compact high accuracy portables are ideal for lighting surveys. Small in size, they are easy to carry and store. Just the right amount of damping gives you maximum ease of reading. The AP-9 is available in almost all ranges as voltmeters, ammeters, milliammeters, single-phase wattmeters, and also with pointer-stop mechanism.

Accuracy: ¾ of 1% full scale for AP-9 (a-c)
½ of 1% of full scale for DP-9 (d-c)

Weight: about 2½ pounds.

PRICE: $58.30 AND UP*

ACCURATE TO WITHIN ¾ OF 1% OF FULL SCALE

6 Regulator Surveys Simplified With 30-day Type CF Inkless Recorder

With the Type CF Inkless Recorder one man can supervise the power requirements for an entire plant. Charts last up to 30 days; no ink to freeze or evaporate; available in a variety of voltage ranges; weather seal and temperature compensation permit use out-of-doors. Checking regulators or making plant surveys is made easy with this lightweight portable.

Accuracy: Up to ±1½% full scale.

Available for a-c or d-c operation.

Weight: only 12 pounds.

TYPICAL PRICE: $121.00*

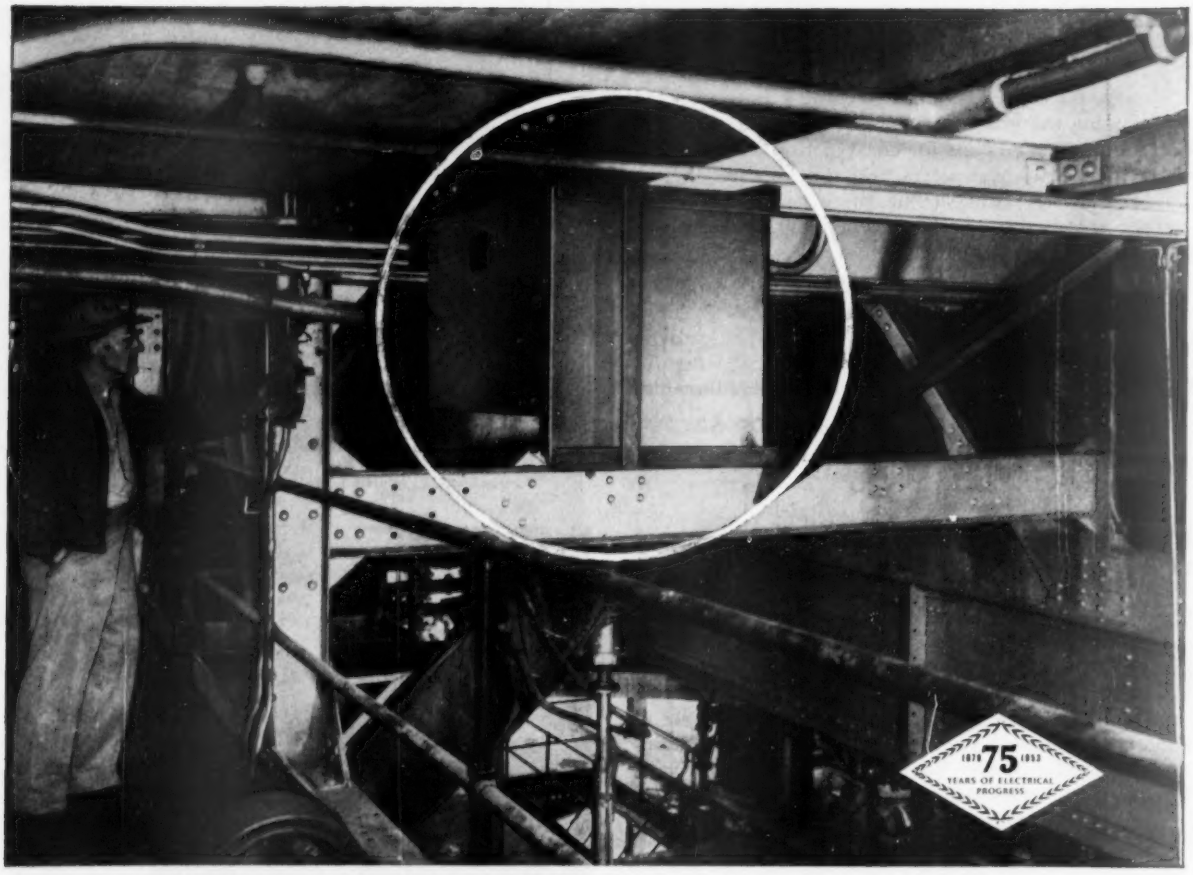
*Manufacturer's suggested retail price.

602-240

WEATHER SEAL PERMITS OUT-OF-DOORS OPERATION

For further Information, contact your nearest G-E Apparatus Sales Office, Agent, or Distributor

GENERAL ELECTRIC



60-kvar capacitor unit shown above is part of the 600-kvar installation that permitted a 10% increase in load.

Capacitors can be put in out-of-the-way places—such as on these existing horizontal I-beams to conserve space.

Seriously overloaded circuits take on 10% more load after G-E Capacitors are added

American Crystal Sugar Co. profits from an emergency that arose during a recent sugar refining "campaign."

During a sugar beet "campaign" which lasts from July to December, the American Crystal Sugar Company of Clarksburg, California, operates 24 hours a day. Shutdowns mean costly financial losses.

That's why the company really had an emergency on its hands when its electrical facilities became seriously overloaded in a recent campaign. However, the solution was simple. A call to G.E. brought 600 kvar of capacitors to the plant in time to prevent a "burnout."

A short time after the order was placed, the capacitors were installed and in operation. The plant's power factor climbed from 86% to about 97%. This relieved the overloading—*and released enough capacity to handle a subsequent 10% increase in load!*

CAPACITORS HAVE MANY USES

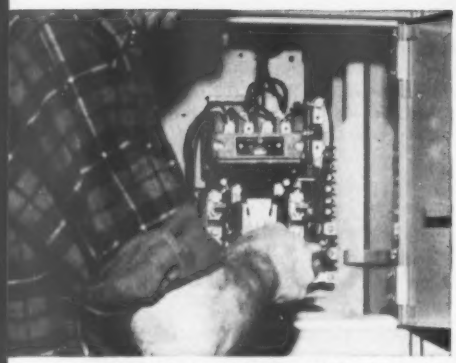
They can often free distribution facilities to carry 20 to 30% more load. Where voltage drop is a problem, capacitors can provide the needed voltage boost inexpensively. And if your power factor is below 85%, and you have a power-factor or kva-demand clause in your contract, they can usually cut your power costs.

For more information, see your local G-E Apparatus sales office, or authorized G-E agent or distributor. Or write to Section 407-209 for booklet GEA-5632—"How to Reduce Power Costs and Gain System Capacity." *General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

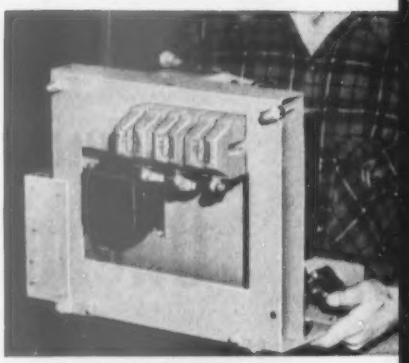
ENGINEERED FOR YOU, the new G-E motor control center is the result of intensive field surveys which told us what industry wants most. It provides maximum flexibility (units easily interchangeable) for central control of a-c motors up to 200 horsepower.

Here are Six Reasons for Specifying the New G-E Motor Control Center



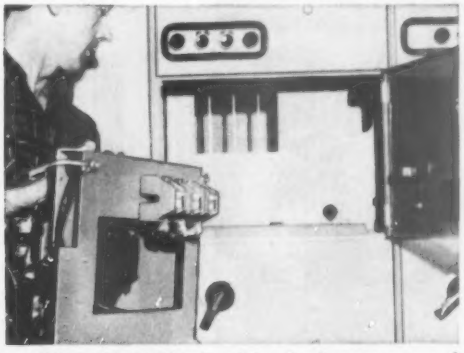
1 FOUR-INCH TROUGH for incoming power lines; terminals in front for easy wiring, maximum accessibility.

2 UNITS EASY TO CHANGE. To remove, disconnect terminals, pull unit out. Units easily changed since *all* components are on unit frame.



3 LIGHTWEIGHT UNITS are compact and easy to handle. This Size 1 starter unit weighs only 30 pounds.

4 ACCESSIBILE WIRING. Contactors, relays, pushbuttons, and breaker are easily accessible from all four sides.



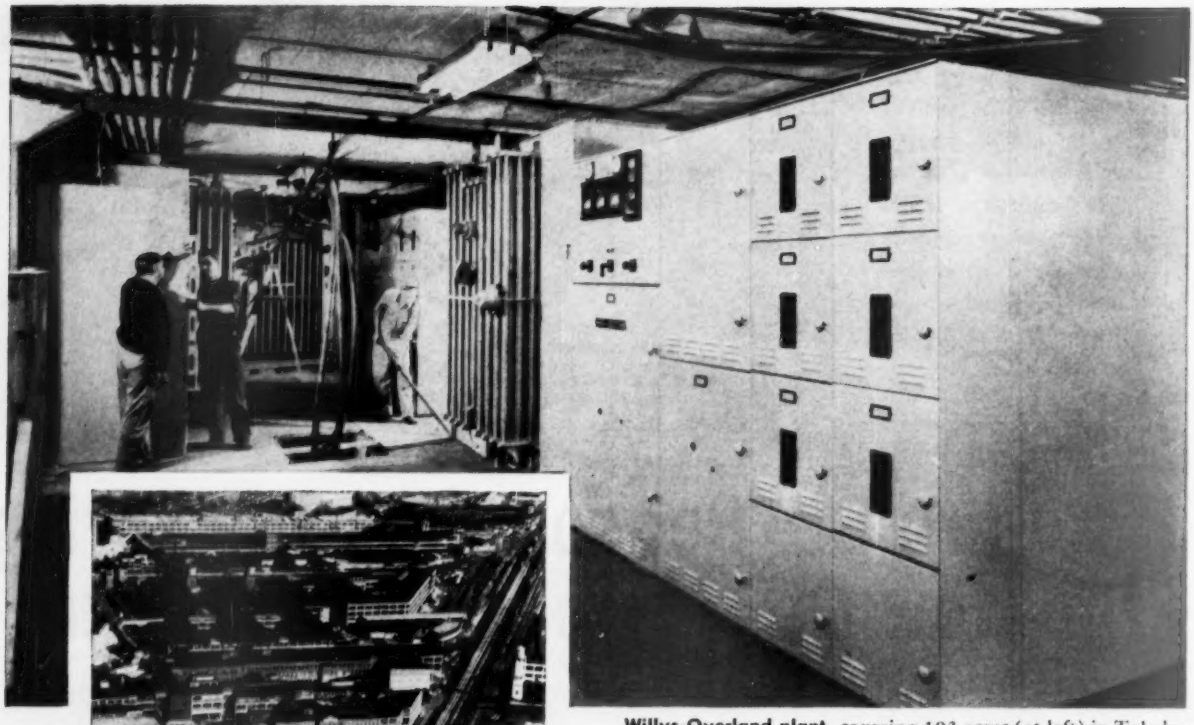
5 BUS PROTECTED. Steel barrier keeps personnel away from bus. For added safety, compartment doors can be closed while unit is out of compartment.

6 DISCONNECT POSITION cuts unit power off; bus connections made automatically in operating position.

FOR FURTHER INFORMATION, contact your nearest G-E Apparatus Sales Office or authorized G-E distributor, or write Section 781-2 for Bulletin GEA-4979A today. General Electric Company, Schenectady, New York.

You can put your confidence in—

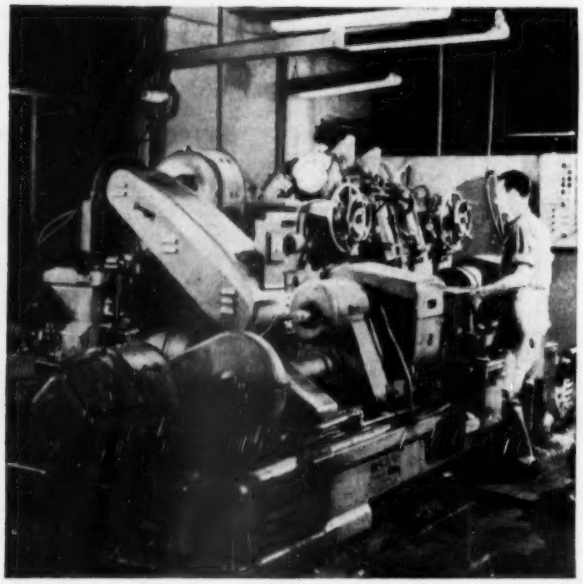
GENERAL ELECTRIC



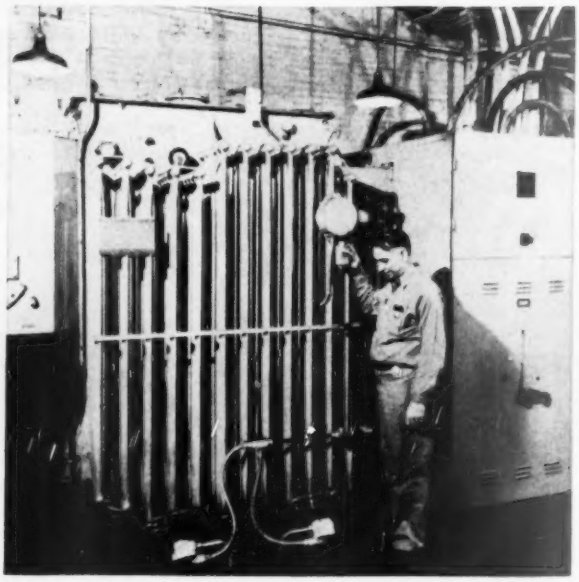
Willys-Overland plant, covering 103 acres (at left) in Toledo, O., adds five new G-E unit substations to expand simply and easily its radial distribution system. Total plant capacity is now 26,000 kva. Three of the 1,500-kva subs (above), with two others, furnish power to aircraft landing gear division.

AT WILLYS-OVERLAND—

One of nation's first load-center

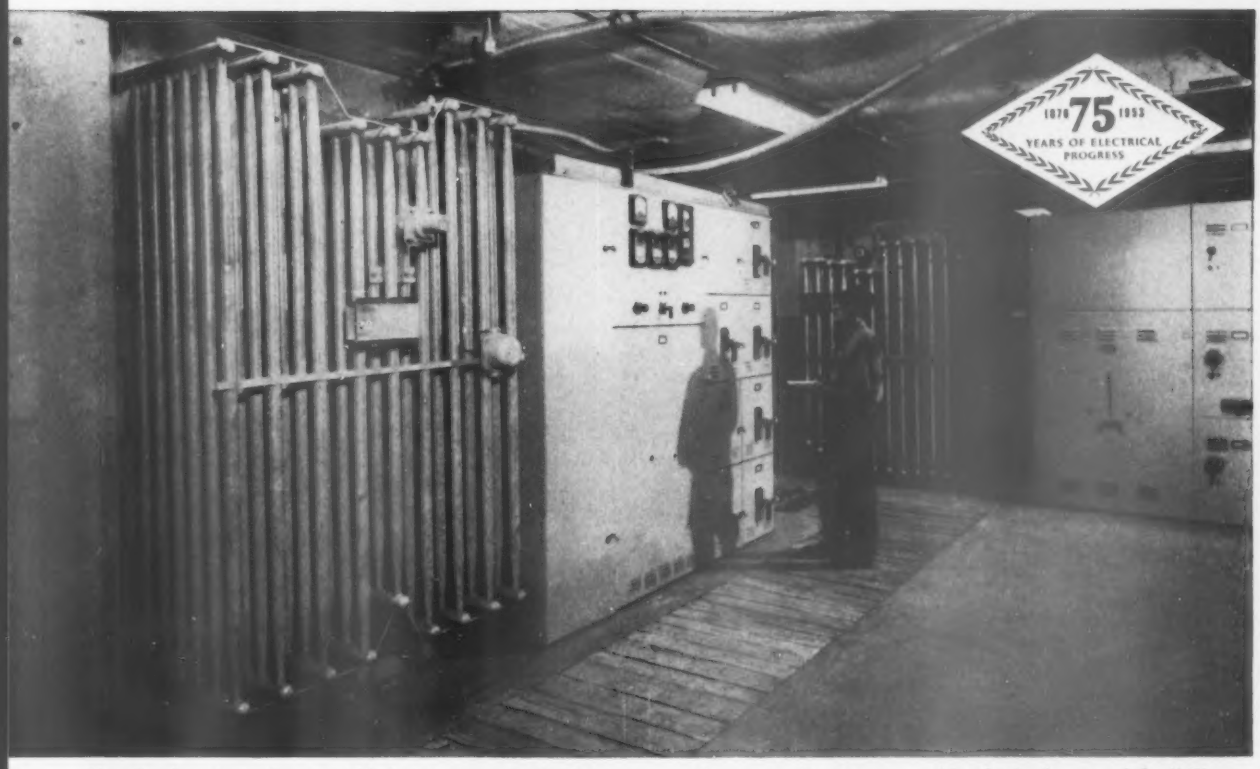


Grinder for crankshaft pin bearings is powered by a G-E unit substation, 4160-volt to 440-volt, which is located just beyond screen at left, adjacent to the load area.



Installed since 1945, when original system was expanded, G-E unit substation, with Pyranol* transformer, has been operating 24 hours a day, 5 days a week, with low maintenance cost.

*Reg. Trade-mark of General Electric Co.



New load-center units, are added to system which has operated for 13 years without power failure. Addition of new substations, like the two new 1,500-kva units above, does not alter over-all system, provides high degree of flexibility to handle shifts in plant loads. Unit subs, used as building blocks, can be placed wherever needed.

systems: Never a power failure!

G-E radial distribution system, installed in 1939, easily expanded to 26,000 KVA for increased plant loads

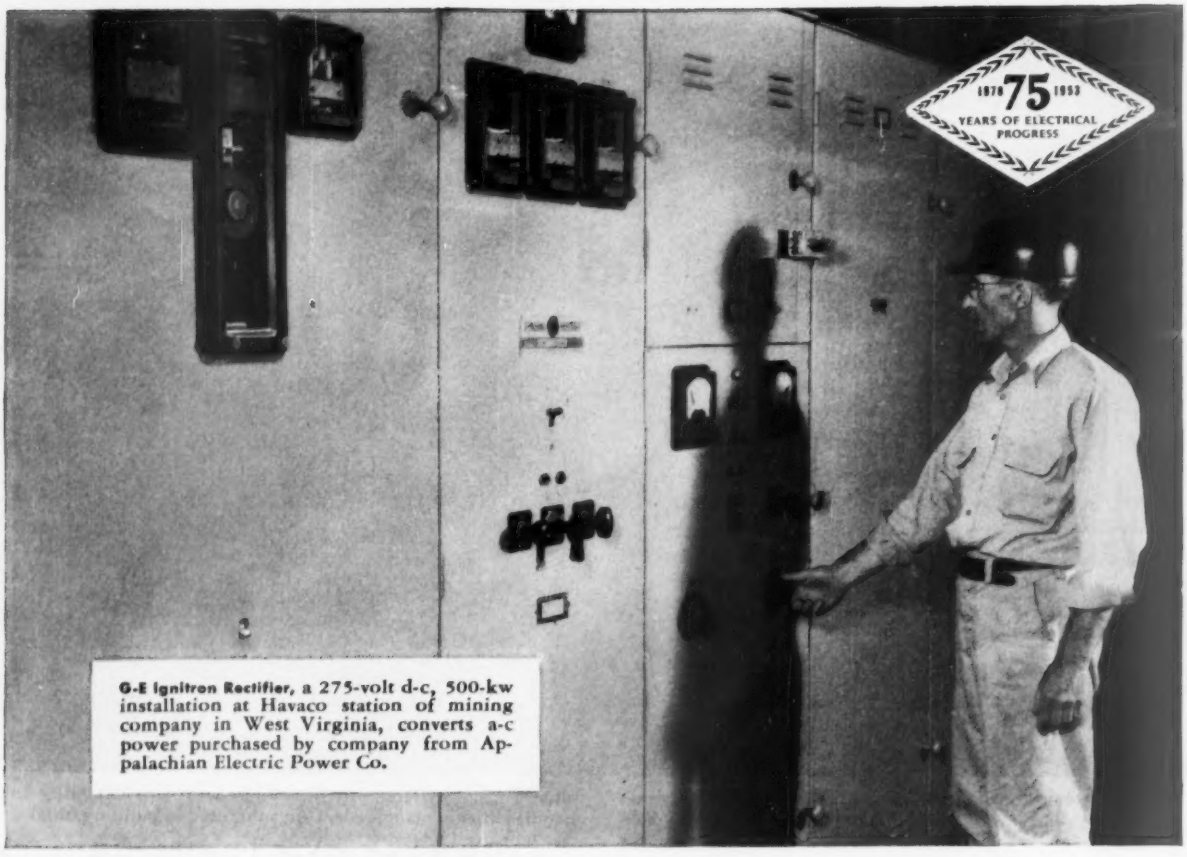
Flexibility in reliable power distribution for stepped-up production of Jeeps . . . quick, easy power expansion at little expense . . . low-cost maintenance with maximum safety. The Willys-Overland Company in Toledo found these advantages of its plant's radial distribution system multiplied when five new G-E 1,500-kva load-center substations were added recently for greater plant capacity.

During the past 13 years of trouble-free operation, engineers have had first-hand experience with the low cost, simplicity, and reliability of the radial system. A G-E outdoor unit substation furnishes plant power, steps down utility voltage to a usable 4,160 volts. Eighteen unit substations handle load requirements in more than two-score buildings on the 103-acre tract.

This installation is just one example of the way G-E engineering helps industry meet demands for more power. For further information, contact your G-E sales representative, or write for GEA-3592. General Electric Company, Schenectady 5, New York. 881-1

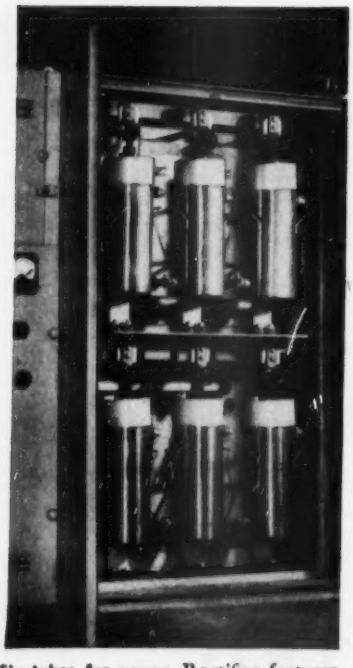
Outdoor G-E master unit substation, plus an indoor G-E station, furnishes power for 90 per cent of Willys-Overland capacity.

GENERAL ELECTRIC



G-E Ignitron Rectifier, a 275-volt d-c, 500-kw installation at Havaco station of mining company in West Virginia, converts a-c power purchased by company from Appalachian Electric Power Co.

8 years of dependable operation



Six tubes for power. Rectifier features simple design, no major moving parts to wear out.

G-E Ignitron Power Rectifiers, requiring minimum maintenance, operate at top efficiency under rugged mining conditions.

For round-the-clock service, year in and year out, G-E Ignitron Rectifiers give dependable d-c power under most adverse circumstances.

In the mountainous, isolated areas of West Virginia's mining country, for example, seven General Electric rectifier substations, all equipped with Ignitron Rectifiers, have serviced mines of a large coal producing company in the New River and Pocahontas fields since 1944. And over this 8-year period, the company reports, the G-E Ignitron Rectifiers have given safe, and near continuous service—with very low overall maintenance costs.

Proved-in-service G-E Ignitron Rectifiers are chosen for these hard jobs because they provide maximum protection to operating personnel . . . possess an efficiency generally higher than rotating power-conversion units . . . have no major moving parts that need replacement or require extensive upkeep. And they are reliable. If regular inspection periods are maintained, G-E Ignitron Rectifiers can be left unattended, for months at a time, with the assurance they will give satisfactory service during all that period. Supplied as a complete packaged unit with transformer and metal-enclosed switchgear, the installation occupies minimum space.

Call or write your nearest G-E sales office for information on a G-E Ignitron Rectifier to fit your d-c power requirements. General Electric Company, Schenectady 5, N. Y.

324-6

GENERAL ELECTRIC

Look to
National Electric
for the

KEY TO
BETTER
PLANTS

Conduit Systems

SHERARDUCT

Full weight, threaded, rigid steel conduit fortified against rust and corrosion by the "Sherardizing" process of galvanizing, for lifetime protection. (also Xduct Electro-Galvanized and Economy Black Enamel Finishes.)

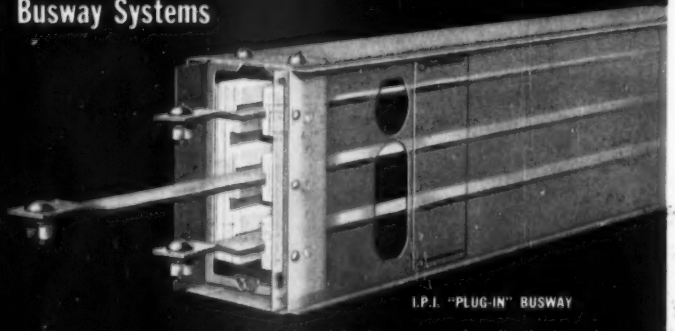
XDUCT JUNIOR

Electrical Metallic Tubing. Steel, electro-galvanized, then further protected inside by a smooth, lustrous coating of durable, clear enamel.

FLEXSTEEL

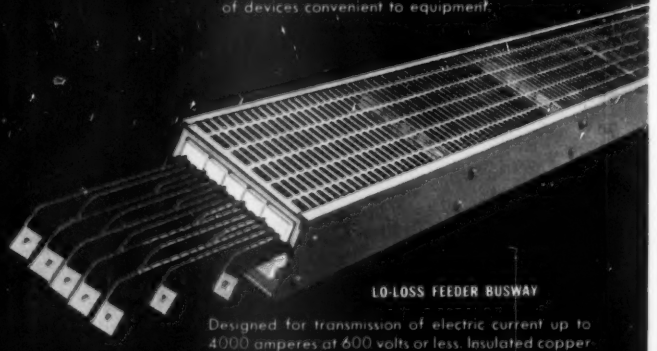
Galvanized, flexible-steel conduit. Continuous runs from outlet to outlet reduce installation costs. Provides an economical "pull-in pull-out" electrical system.

Busway Systems



I.P.I. "PLUG-IN" BUSWAY

An enclosed busbar system for distributing electrical power, 225 amperes up to 1500 amperes, 600 volts or less. Approved for mounting in horizontal or vertical position. 14 Plug-in openings per 10' length, staggered on two sides, permit insertion of devices convenient to equipment.



LO-LOSS FEEDER BUSWAY

Designed for transmission of electric current up to 4000 amperes at 600 volts or less. Insulated copper bars mounted on close centers provide low reactance—high efficiency. Ideal for welding and other low power factor loads and for riser application. Approved for vertical or horizontal mounting.

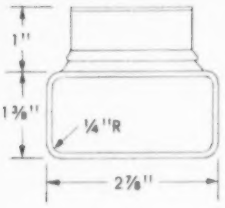
National Electric holds the key

National Electric holds the key to efficient electric distribution in *your* plant—whether you plan to build a better plant, or effectively modernize your present one. That's because each National Electric distribution system is especially designed to meet certain specific wiring needs and to withstand the rugged requirements of American industry.

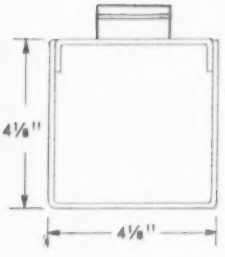
National Electric Products stands for highest quality, a name immediately recognized as a leader in the electric industry for nearly 50 years. It is this leadership that has made National Electric the world's *largest* manufacturer of electrical distribution systems today.

Your electrical distribution system is the lifeline of your business. Select it with care. Look them all over. Study their features and the "added extras." Compare them for quality, for convenience, for economy, for flexibility, for salvability. Whatever your electric distribution problem, we think you'll agree—*it's National Electric all the way.*

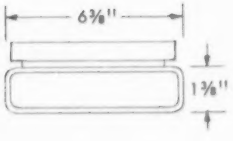
Underfloor Raceway Systems



The steel underfloor raceway system that provides convenience outlets at the floor surface. For power, lighting, telephone and signal service in any type of floor construction. Safe, attractive service fittings of brass.

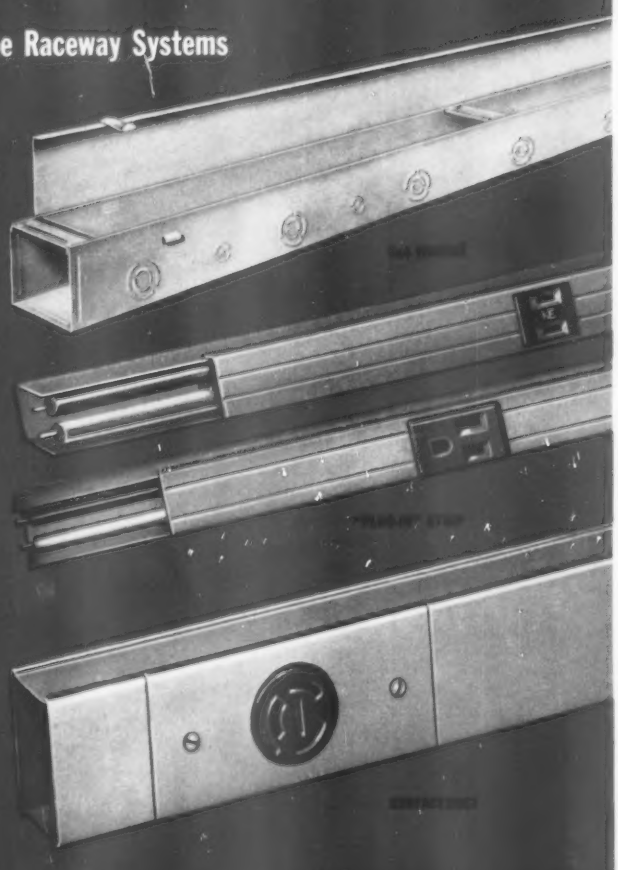


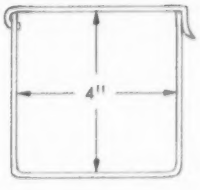
The new Nepcoduct Industrial Underfloor Wiring System is a steel raceway of 4" internal width and depth. Suitable Junction Boxes, Assembly Parts and Service Fittings complete the System. Brings outlets already threaded to the floor surface for quick, efficient power service to machines located anywhere in the plant.



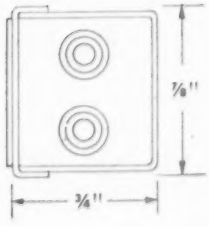
Used in conjunction with Fenestra Steel Floor Panels, Nepco Header Duct System is an all-steel grounded raceway from the distribution outlet to the structural steel floor panels. Electric wiring through this combined raceway system provides the availability of electric outlets in any square foot of floor area—a completely *electrified* cellular steel floor.

Surface Raceway Systems

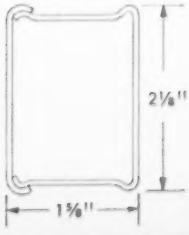




A hinged-lid steel wireway for feeders, branch circuits, control and signal wiring up to 600 volts. Speeds power rewiring. Eliminates exposed wiring hazards. Hanger type coupling permits flush mounting when necessary. Painted gray for color harmony. Galvanized Wirewā also available for maximum corrosion resistance in coastal areas.



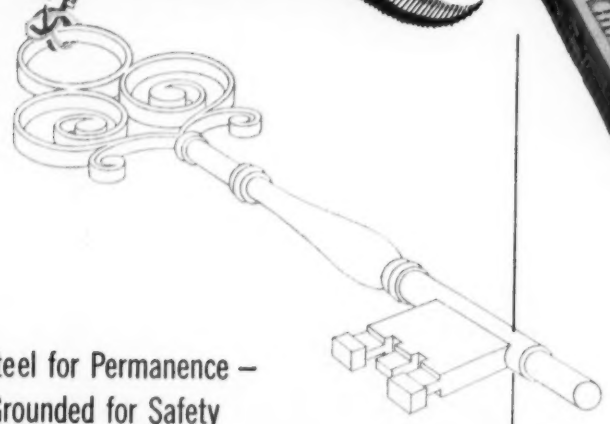
Multi-outlet wiring assemblies that provide outlets every 18" or 6". Modern, streamlined trim. Safe and strong. Type CF-2 for constant energized service. Type CF2-G (with system grounding facility) for portable equipment, tools, etc. Grounded or ungrounded devices from same outlet.



A 2-piece, all-purpose industrial "lay-in" raceway for every type of service up to 60 amp. No wire fishing. Accommodates all manufacturers' approved devices. Economical to install for today's wiring needs yet has plenty of capacity for tomorrow's requirements.

For All Systems

There are NE insulated building wires and cables with every type of insulation and covering, connectors, boxes and accessories to meet the requirements of any industrial, commercial or residential wiring job.



Steel for Permanence –
Grounded for Safety

Write for complete detailed catalogs and specifications. All National Electric Products are listed by Underwriters' Laboratories, Inc. and sold through leading electrical distributors.

EVERYTHING IN WIRING POINTS TO

National Electric Products

PITTSBURGH, PA.

3 Plants • 7 Warehouses • 34 Sales Offices

NATIONAL ELECTRIC PRODUCTS CORPORATION
Pittsburgh, Pennsylvania

Please send me catalog information on the following steel clad wiring systems.

☐ Conduits ☐ Underfloor Raceways ☐ Surface Raceways ☐ Wire and Cables
☐ Busways ☐ Boxes and Fittings

Name _____ Title _____

Company _____

Address _____

NOW there is a way to get THE FACTS
—get them fast, direct, on the record—
and THIS IS I.T.*

***Industrial Televoice,** EDISON's new floor-to-management communications system . . . Here, at last, is a "fact conveyor" that works—because it's easy. It's easy for the man on the production floor: he doesn't write anything—he just talks. And it's equally easy on the man at the management control point: he doesn't have to listen to the talk—he reads it!

A network of TELEVOICE phones is installed wherever vital information originates—and connected to central recording equipment in the appropriate department. Reports and requests are "phoned" in from the floor and recorded on plastic discs. At frequent intervals, the recorded information is transferred to your forms and distributed for action, control or analysis. That's all there is to it!

New as it is, INDUSTRIAL TELEVOICE has already proved its value in controlling and coordinating production, inspection, maintenance and shipping and receiving. But the whole story has yet to be written. In your plant, you'll probably discover additional applications we haven't even dreamed of.

Once you see INDUSTRIAL TELEVOICE in action, you'll recognize it as the *communication* system that makes *operating* systems work.

Industrial
EDISON TELEVOICE

Ask for trial demonstration!

We'll be glad to arrange a trial demonstration of EDISON INDUSTRIAL TELEVOICE in your plant. Just send the coupon—or contact your nearest EDISON VOICEWRITER representative (see classified directory).

Thomas A. Edison
INCORPORATED

EDISON *(Ediphone Division)*, 17 Lakeside Ave., W. Orange, N. J.

Yes, EDISON, I want information on a trial demonstration of INDUSTRIAL TELEVOICE.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

5 proven ways you can use GLASS —for better product performance!

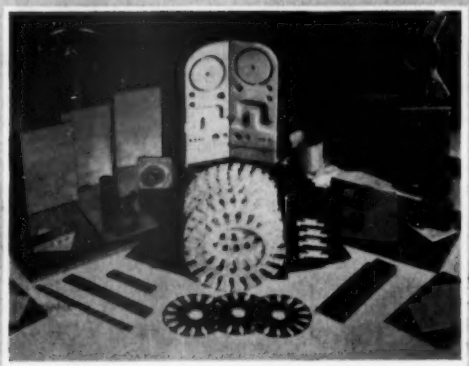
There's no substitute for proven performance —and for more than 15 years Owens-Corning Fiberglas* products have been used by design engineers in electrical insulating components to make good electrical equipment perform even better. Five such materials are shown below and on the facing page. All are proven . . . all are universally available . . . and most are priced no higher than ordinary organic insulating products.

For further details on any of these five proven ways to insure better product performance—and names of suppliers nearest you—be sure to send in the coupon *today*.

**Fiberglas is the trade mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with fibers of glass.*

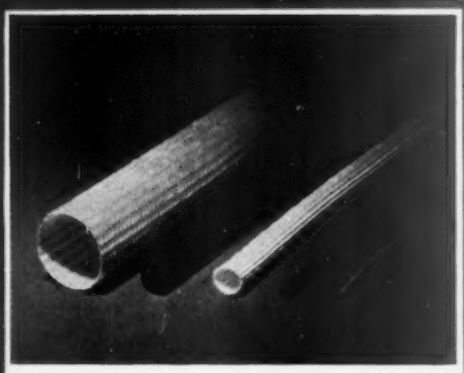
"if it's Fiberglas, it's Owens-Corning!"

OWENS-CORNING FIBERGLAS CORPORATION • TEXTILE PRODUCTS DIVISION • 16 EAST 56TH STREET, NEW YORK 22, NEW YORK



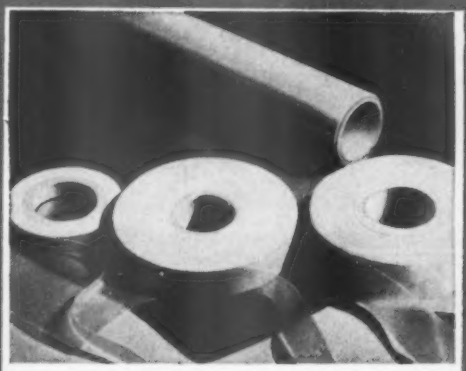
electrical laminates

Fiberglas yarns absorb energy without permanent set—give Fiberglas glass-base laminates maximum impact resistance. Retain their shape—can't shrink or swell—and punch clean, handle well. Available impregnated with phenolic, polyester, melamine, silicone resins.



eeving and tubing

Sleeving and tubing made with Fiberglas yarns offer unsurpassed strength, flexibility and resistance to moisture, oils, most acids. Won't burn during soldering work and is easier to slip over conductors because it is round and smooth inside.

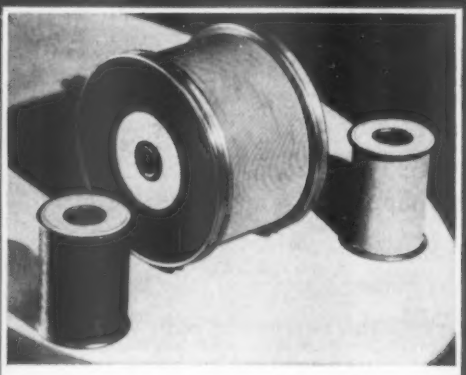


varnished cloth

Glass can't burn; cloths woven of Fiberglas yarns thus offer unparalleled fire safety. Permit operation of equipment at higher ambient temperatures for longer time with fewer breakdowns. Dissipate heat faster, too—provide greater overload insurance.

electrical tapes

Exceptional tensile strength and smaller diameter of Fiberglas yarns means thinner, stronger tapes—less bulky wrappings, savings in space. Fewer equipment breakdowns, too, because Fiberglas yarns cannot stretch or shrink . . . won't burn . . . and are resistant to moisture and most acids.



magnet wire

Fiberglas yarns used in magnet wire are thinner than organic textiles, yet withstand higher temperatures. Makes possible the design of smaller, lighter, higher-rated equipment—with corresponding savings in metals and other expensive materials.

Clip the coupon below and mail today for your copies of these booklets!

Owens-Corning Fiberglas Corporation
Electrical Sales Division
16 E. 56th Street, New York 22, N. Y.

Please send me the following booklets:

- ☐ Sleeving & Tubing
- ☐ Magnet Wire
- ☐ Electrical Laminates
- ☐ Electrical Tape
- ☐ Varnished Cloth
- ☐ Sources of Supply

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

CITY.....ZONE.....STATE.....

OWENS-CORNING
FIBERGLAS

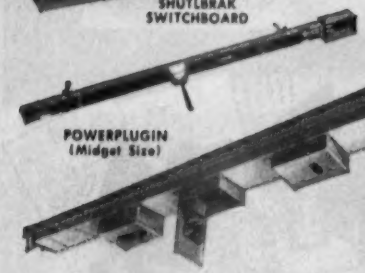
For the Industrial Plant of Today and Tomorrow

INSIST ON FA PRODUCTS

New Production Unit —
ATWOOD VACUUM MACHINE CO.
Rockford, Illinois

SHUTLBRAK SWITCHBOARD

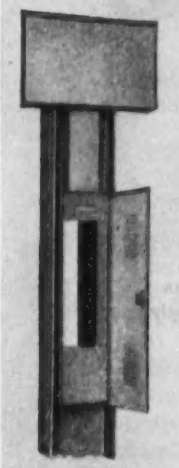
QP QUICKLAG PANELBOARD



POWERPLUGIN (Midget Size)

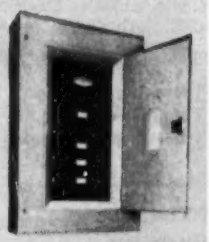
POWERPLUGIN

SCA ENCLOSED SHUTLBRAK SWITCH



COLUMN TYPE PANELBOARD

DUSTITE PANELBOARD



PULFUZSWITCH PANELBOARD

Ⓕ PRODUCTS for the control and distribution of power and light have been specifically geared to the needs of the factory of today and tomorrow.

Besides being safe, efficient, dependable, economical, long-lasting and trouble-free, all Ⓕ switchboards, panelboards, busduct and other similar equipment used in modern industry, have been designed to provide the electrical capacity needed for today and allow for future expansion by the simple addition of necessary units.

If you are planning a new factory, or modernization and improvement of an existing plant — regardless of size — be sure that your electrical distribution system is suited to your needs. Install Ⓕ products — the equipment with a future.

For additional information, consult your nearest Ⓕ representative, listed in Sweet's, or write for bulletins.

Frank Adam Electric Co.

P. O. BOX 357
ST. LOUIS 3, MISSOURI

Makers of: BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

Use of G-E Super Coronol* Cable helps solve difficult cable layout problem

Installation speed important feature of G-E interlocked armor cable system

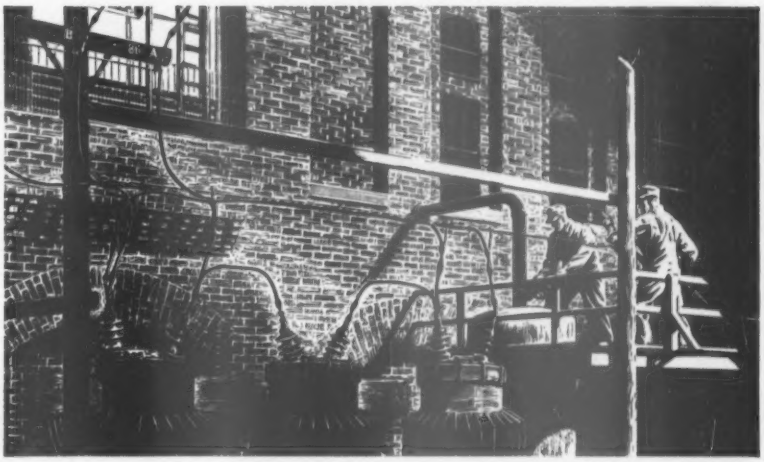
Here's a thought for rewiring plants in a hurry, keeping costs in line, and possibly maintaining production at the same time: Investigate the G-E V-c interlocked armor cable system.

The ease and speed with which this interlocked armor cable system can be installed lowers costs. The cable can be laid quickly—indoors or outdoors—in long lengths, around corners, on low-cost aluminum racks. Engineering time is cut. Threading or bending of conduit is eliminated. Splices are of a simple, mechanical type. Many plants have saved months, not days, because of these features.

Permanent

To our knowledge, no installation of interlocked armor cable has ever suffered mechanical damage sufficient to cause electrical failure. The cable is versatile as well as permanent and makes a neat, clean-looking installation. A booklet that describes the G-E No. 1799 varnished-cambric-insulated interlocked armor cable system is available.

Flexibility of interlocked armor cable is demonstrated here—corners and projections present no installation problems.



The cable layout for these transformer leads was suggested by a G-E wire and cable specialist. The layout resulted in an important improvement in safety and appearance.

Ionization testing standard G-E procedure

In order to make certain that the cable has been properly constructed, G. E. makes an ionization test of every foot of Super Coronol cable rated over 5 kv. This is standard practice. Even continuous lengths as long as 3100 feet have been tested on special equipment made for this purpose. It is tests like these that help to insure the dependability of all G-E cable. If you wish, a G-E wire and cable specialist can furnish additional information about ionization testing.

USEFUL BOOKLET

In one handy booklet you get informative data on G-E Versatol* Geoprene cable's installation and maintenance economies. The booklet, Pub. No. 19-390, can help you determine applications for these dependable, general purpose cables. Write for your free copy today.

*Registered Trade-mark General Electric Company

On any cable problem you can get prompt, expert help from your G-E wire and cable specialist. Here is an example. In the Omaha Public Power District a local brewery was confronted by this hazard—bare wire was used for the drops from an overhead 13.2-kv line to transformers. Liquid waste from vats kept the air moist. And with an elevated platform nearby, it was possible for men working on a condenser to get too close to the high voltage for safety.

In looking for the answer, the Power District asked the G-E Construction Materials Omaha office for a cable layout. The G-E wire and cable specialist submitted one—based on the use of 15-kv Super Coronol Geoprene cable. This cable, which is shielded, not only eliminated the danger from bare wires, but improved appearance as well. Because the cable was preformed in the utility's service shop, and terminations made in advance, installation was made with a minimum of shutdown time.

The next time you have a question on cable or want any of the booklets mentioned in this advertisement, call a G-E wire and cable specialist for expert help. You can reach him at the nearest G-E Construction Materials district office. Or, write Section W68-534, Construction Materials Division, General Electric Company, Bridgeport 2, Conn.

You can put your confidence in—

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

GENERAL ELECTRIC

"TOM:—
IN THE FIRST YEAR AFTER WE CHANGED OUR PLANT TO FUSETRON FUSES, WE ENTIRELY ELIMINATED MOTOR BURNOUTS FROM SINGLE PHASING AND REDUCED ALL MOTOR BURNOUT BY AT LEAST 75%"

(Excerpt from a conversation of Forrest Baumgardner with Tom Wier)

FORREST BAUMGARDNER, *Chief Electrician*,
Frank Wheatley Pump & Valve Mfr.
Tulsa, Oklahoma.

"FOREST:— DON'T FORGET FUSETRON FUSES DO MORE THAN PROTECT MOTORS THEY PROVIDE 10 POINT PROTECTION!"

TOM WIER,
BUSS Fuseman,
covering Tulsa, Okla.

1 Protect against short-circuits.*

2 Protect against needless blows caused by harmless overloads.

3 Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation.

4 Provide thermal protection — for panels and switches against damage from heating due to poor contact.

5 Protect motors against burnout from overloading.

6 Protect motors against burnout due to single phasing.

7 Give DOUBLE burnout protection to large motors — without extra cost.

8 Make protection of small motors simple and inexpensive.

9 Protect against waste of space and money — permit use of proper size switches and panels.

10 Protect coils, transformers and solenoids against burnout.

* Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York.

Here's why FUSETRON Fuses give All Purpose protection...

A fuse link combined with a thermal cutout — the result, a fuse with tremendous time-lag and much less electrical resistance.

They have the same degree of Underwriters Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to same dimensions as ordinary fuses, FUSETRON FUSES fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 ampere, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

Their cost is surprisingly low.

FUSETRON is a trade mark of the Bussmann Mfg. Co.

Don't Risk Losses!

One **lost** motor . . .
One **needless** shutdown . . .
One **destroyed** switch or panel
One **burned out** solenoid . . .

May cost you far more than replacing every ordinary fuse with a Fusetron dual-element Fuse.

Bussmann Mfg. Co., University at Jefferson,
St. Louis 7, Mo. (Division of McGraw Electric Co.)

Please send me complete facts about FUSETRON dual-element Fuses.

Name_____

Title_____

Company _____

Address _____

City & Zone_____ State_____ 553

WITH EVER NEW PEAKS IN

GENERAL CABLE SHIPMENTS
FOR USE WITH PRODUCTS PRODUCED

NATIONAL PRODUCTION GROWTH*

1944 1945 1946 1947 1948 1949 1950 1951 1952

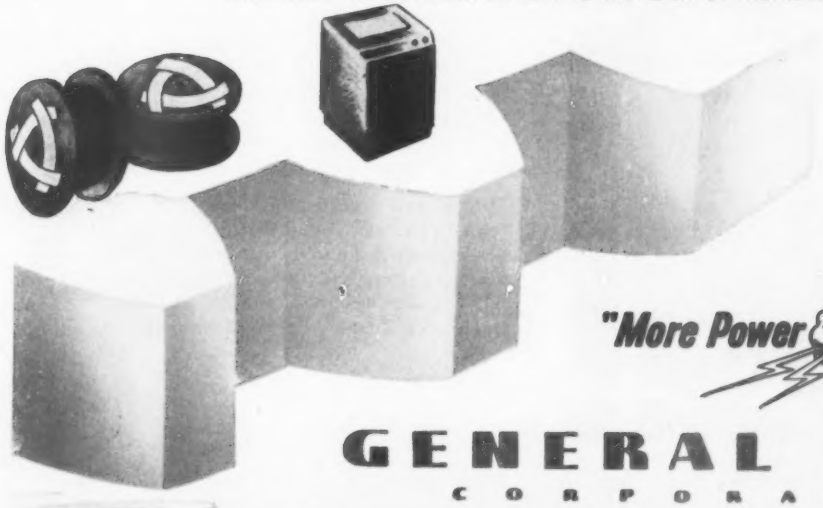
*Federal Reserve System Data

NATIONAL PRODUCTION...

GENERAL CABLE

Still means Consistent Dependable Supply

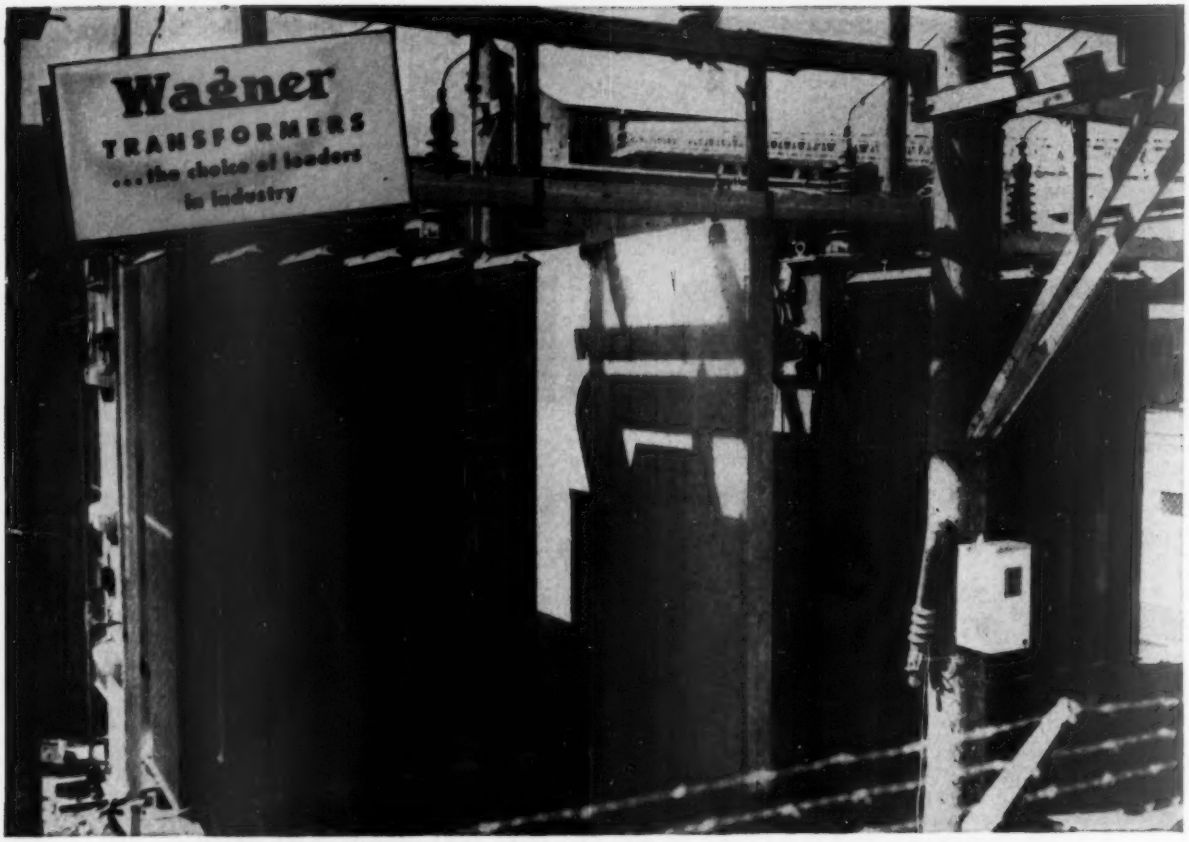
During a 70 year span as a prime supplier of wire and cable to every industry, General Cable's growth has been part of America's ever-mounting national production. Anticipating production trends—with our sights always toward growth—our production is planned for smooth, adequate supply. Evidence is in the thousands of varied wires and cables manufactured in the chain of strategically located General Cable manufacturing plants. Your needs are serviced through our sales offices . . . through our wholesalers . . . from plants, warehouses, and distributor stocks that blanket the country from coast to coast, and from our northern border to the Gulf of Mexico.



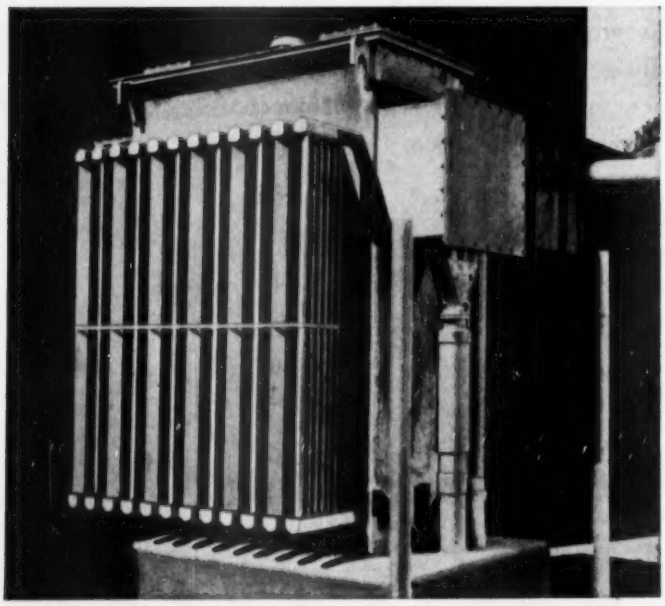
"More Power to You"®

GENERAL CABLE
CORPORATION

EXECUTIVE OFFICE: 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK • SALES OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES



DUPLICATE TRANSFORMERS and feeders allow either to carry load in emergencies. The three phase Wagner Power Transformers are each rated 6000 kva with provision for an increase in capacity to 8000 kva for future expansion.



ONE OF FIVE Wagner three phase, non-inflammable liquid filled unit substation transformers used in this installation. Each transformer is rated 750 kva, 2400 to 480 volts, 60 cycle; and each is located as close as possible to load center.

Wagner Power Transformers have been serving the power industry dependably for over sixty years. They are compact in design and are built with painstaking care to give them inherent strength and stability. They have sufficient capacity to not only carry their normal load, but to be able to handle loads—again and again—whenever emergencies arise.

Consult a Wagner engineer on your next transformer installation. Thirty-two branch offices, located in principal cities, are at your service. Bulletins TU-180 and TU-181 give information on the complete line of dependable Wagner Transformers.

Wagner Transformers selected for modernized distribution system in midwest cement plant

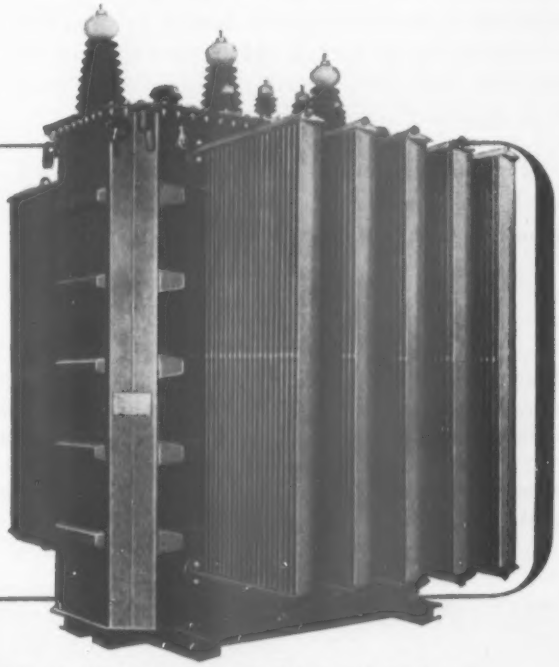
Cement making is a 24-hour, 7-day week business requiring some 80 separate operations, the use of much heavy processing machinery and equipment, and tremendous amounts of dependable power.

The modernized Prospect Hill plant of the Missouri Portland Cement Company provides a fine example of an up-to-date distribution system in an application where considerable amounts of power are utilized at primary voltages. 12,000 kva of transformer capacity was required for connected and demand loads, with provisions for a 33 percent increase in capacity for future expansion.

Two Wagner 3 phase power transformers, each rated 6000 kva, with an ultimate of 8000 kva to be obtained with the addition of cooling fans, were used to meet this requirement for the main substation.

In addition to the main substation, there are five 750 kva unit substations, each located as close as possible to the load centers of the particular areas they serve. These substations are powered by three phase Wagner unit substation transformers, each with identical specifications.

Wagner transformers were chosen for this installation, as they are for a great many industrial and power company installations, because of their ability to give continuous service over unusually long periods of time.



Wagner Power Transformers meet ASA C57 standards

Now, you can simplify your specifications and gain the advantages of improved design at reduced cost by ordering *standardized* Wagner Power Transformers. Wagner Transformers meet all ASA C57 standards for voltage ratings, taps, impedances and both standard and optional mechanical features. Get full information from your nearby Wagner engineer, or write us.

Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6412 Plymouth Avenue • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

753-1

Another *Major Plant* meets WITH FLEX-A-POWER

Provision for future needs is just as important as meeting present electrical distribution requirements in modern factories and office buildings.

You can count on the fact that loads will increase substantially over the years — and that continued efficiency of the building will depend on complete freedom to change layout, add or move electrically operated equipment, rearrange circuits, or even make additions to the building itself.

Trumbull pioneered Flex-A-Power bus systems which make equipment relocations or additions almost as simple as plugging in a toaster, and the addition of load or major alterations swift and simple.

The initial installed cost of Flex-A-Power is often *below* that of wire and conduit, but this substantial saving is minor compared with permanent reduction of down time, ability to make desired alterations for efficient layout, or make mobile take-offs from your power systems.

Your Trumbull distributor, backed by nearby Trumbull engineering personnel, can give you authoritative information, prompt quotations and speedy delivery. Or write for a more detailed description of Trumbull Flex-A-Power systems.

New 14-acre plant of Hamilton Standard Division, United Aircraft Corporation, incorporated a complete Trumbull Flex-A-Power electrical distribution system, which helped to effect a major move with minimum loss of production time.

Electrical Contractor: Lord Electric Co., Boston
Distributor: Graybar Electric Co., Boston

Architect: Albert Kahn, Inc., Detroit
General Contractor: Turner Construction Co., Boston

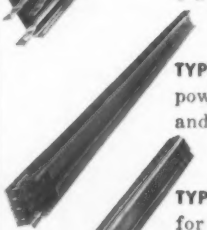
present and future power requirements

Quick Facts

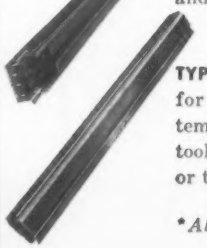
About 4 types of Flex-A-Power which, in combination, will meet almost any low voltage distribution requirement.

***TYPE LVD.** For high capacity feeder applications, or as a riser in multi-story buildings carrying high currents over long distances, with low voltage drop. 600-4000 ampere ratings, 2-, 3- and 4-pole and 3-phase, 4-wire solid neutral, 600 volts.

***TYPE FVK.** Operates like a panelboard running the length of the plant. Power outlets at one-foot intervals, tapped by Flex-A-Plug fusible switches or breakers. 225-1000 amperes, 2- and 3-pole and 3-phase, 4-wire solid neutral, 600 volts.



TYPE TK. A heavy-duty trolley busway, brings *mobile* power to production lines, hoists and cranes. 100, 200 and 400 amperes, 2- and 3-pole, 600 volts.



TYPE LTG. A plug-in and trolley busway, unmatched for lighting systems. Individual lights or entire systems can be rearranged with plug-in ease. Portable tools enlarge their usefulness by means of LTG plugs or trolleys. 50-amperes, 2-, 3- and 4-pole, 300 volts.

**Aluminum busbars optional.*

OTHER RECENT FLEX-A-POWER INSTALLATIONS

SHAMROCK HOTEL,
Houston, Texas

UNITED NATIONS BUILDING

SEALED POWER CORPORATION,
Rochester, Indiana

GIMBEL'S MILWAUKEE STORE

HOTEL ROOSEVELT,
New Orleans, Louisiana

UNIVERSITY OF WASHINGTON MEDICAL SCHOOL,
Seattle, Washington

REMINGTON RAND LABORATORY,
Norwalk, Connecticut

STANDARD KNAPP DIVISION,
Emhart Mfg. Company,
Portland, Connecticut

CANDLER BUILDING,
Atlanta, Georgia

HARTFORD FIRE INSURANCE CO.,
Hartford, Connecticut

CITY NATIONAL BANK,
Houston, Texas

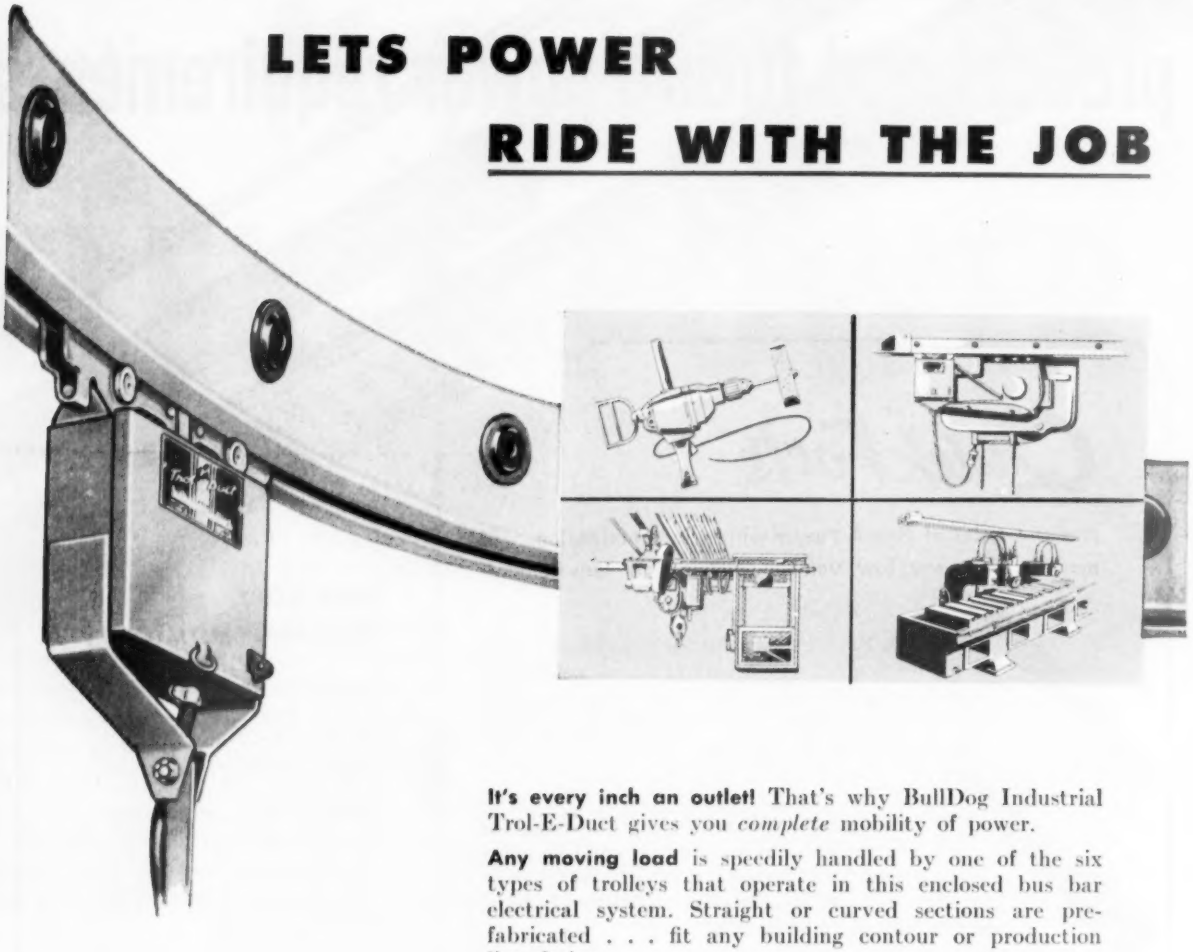
TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

BULLDOG INDUSTRIAL *Trol-E-Duct*

LETS POWER

RIDE WITH THE JOB



It's every inch an outlet! That's why BullDog Industrial Trol-E-Duct gives you *complete* mobility of power.

Any moving load is speedily handled by one of the six types of trolleys that operate in this enclosed bus bar electrical system. Straight or curved sections are prefabricated . . . fit any building contour or production line design.

Completely reusable, Industrial Trol-E-Duct brings you substantial production gains because it practically eliminates "downtime." Trolleys can be removed and replaced without current shut-down . . . no sagging wire conductors to halt production for maintenance. There's no more time wasted hunting for a free outlet . . . no more messy, dangerous extension cords.

Industrial Trol-E-Duct is another thoroughbred BullDog product designed to give you matchless economy with highest efficiency and flexibility. Write today for free Bulletin IT-655. BullDog Electric Products Company, Dept. FM-53, Detroit 32, Michigan. ©BEPCO

BULLDOG
ELECTRIC PRODUCTS COMPANY

FLEXIBLE BUSDROP CABLE

POWERDUCT eliminates expensive rewiring when equipment must be moved.

This cable makes machinery mobile

PLUG IN POWERDUCT at busduct and machine. See how spring keeps cable taut. There is no costly rigid conduit to rip out.

You may not be utilizing the full flexibility of your busduct system . . . if you aren't matching it with equally flexible, UL-approved ANACONDA Powerduct Cable.

This busdrop cable permits you to quickly relocate machinery. There is none of the expense and bother of ripping out permanent or semi-permanent wiring.

Powerduct is the only nonmetallic-armored busdrop cable approved by Underwriters' Laboratories, Inc. for busway branches under section 3646, 1951 National Electric Code. Always ask for it at your regular supplier. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.* 53319

ANACONDA®

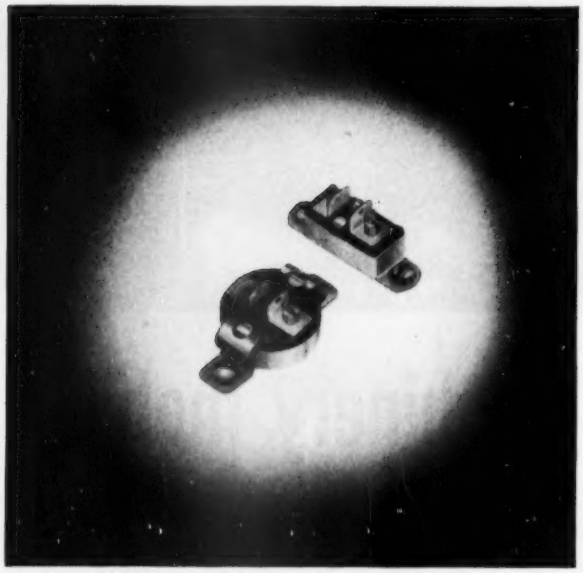
TODAY'S HEADQUARTERS FOR INDUSTRIAL WIRING

Building wire and cable • power and busdrop cables • control and communication wire and cable • distribution cables • magnet wire • wire and cable accessories

New Miniature THERMOSWITCH® control with many great uses

1. WHAT ARE YOU WORKING ON? Is it a project where the temperature requirements are rigid but the size of the control must be miniature? Designed first for aircraft and airborne missiles of the future, this new Fenwal Miniature THERMOSWITCH unit has the answer engineers seek . . . adjustable . . . super-sensitive . . . stable . . . all in compact and rugged form.

2. MANY USES, MANY PROBLEMS SOLVED for designers now at work on modern or "tomorrow" projects. You can set this new Fenwal Miniature THERMOSWITCH unit anywhere within the range of 0°F to 200°F. It can carry a 250 watt load and withstand vibrations up to 5 G's. Many other wanted characteristics up to now not available in devices of its size.



3. TWO TYPES . . . SAME ADVANTAGES. (*Shown actual size.*) Contacts of both break with temperature rise. Fenwal Miniature THERMOSWITCH controls for electronic devices, precision instruments, aircraft, bearing or motor overheat alarms. Designed precisely for your miniaturization projects.

4. BULLETIN describes these new "Miniatures" in greater detail, gives engineering data. Fenwal's engineering staff is always ready to help in special temperature control projects. For bulletin MC-114 pictured above write
Fenwal Incorporated, 65 Pleasant St., Ashland, Mass.

Fenwal

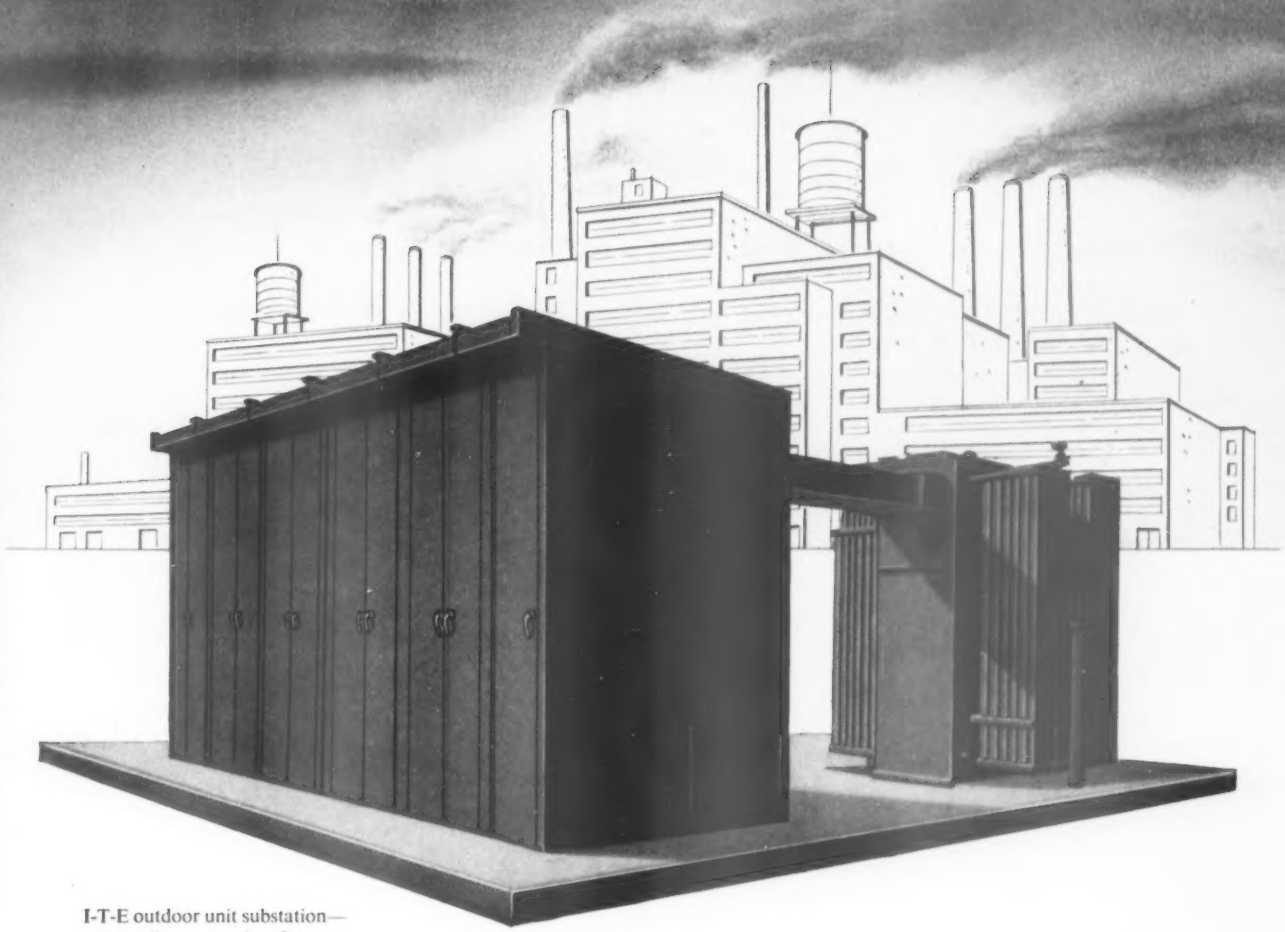
THERMOSWITCH®

Electric Temperature Control and Detection Devices

SENSITIVE... *but only to heat*

Planned Power Distribution

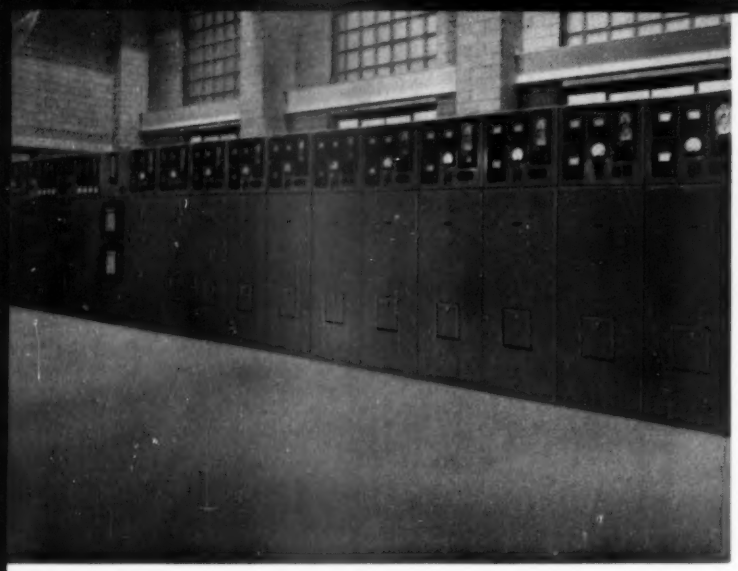
—first step toward increased plant efficiency



I-T-E outdoor unit substation—outstanding example of power equipment planned for efficiency. This substation, a durable, weatherproof unit of transformer and switchgear, can be located close to load center—yet out-of-doors, where it will not take up premium production space inside the plant.

Power is fundamental. The most modern plant, the latest-type production lines can be only as efficient as the electrical distribution system that feeds them.

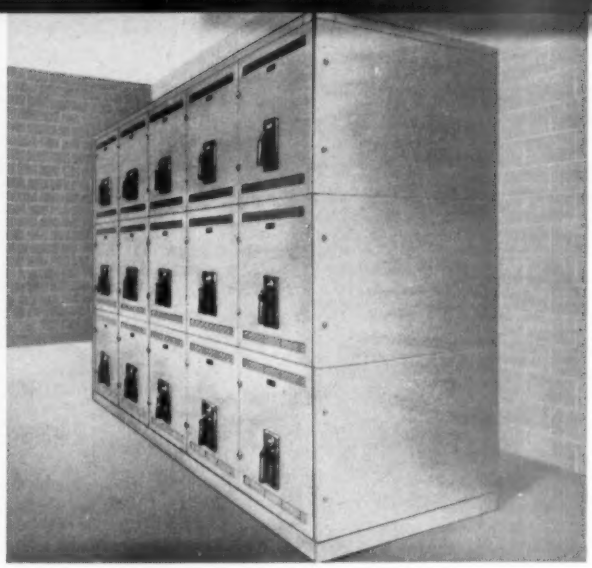
Plan ahead now, and avoid "patchwork" later. An I-T-E application engineer will gladly advise you how to get more efficiency from your power devices, how to lower distribution costs, and get positive electrical protection for your plant.



I-T-E METAL-CLAD SWITCHGEAR

4160 volts — 600, 1200, 2000 amperes
50,000, 150,000, 250,000 KVA interrupting

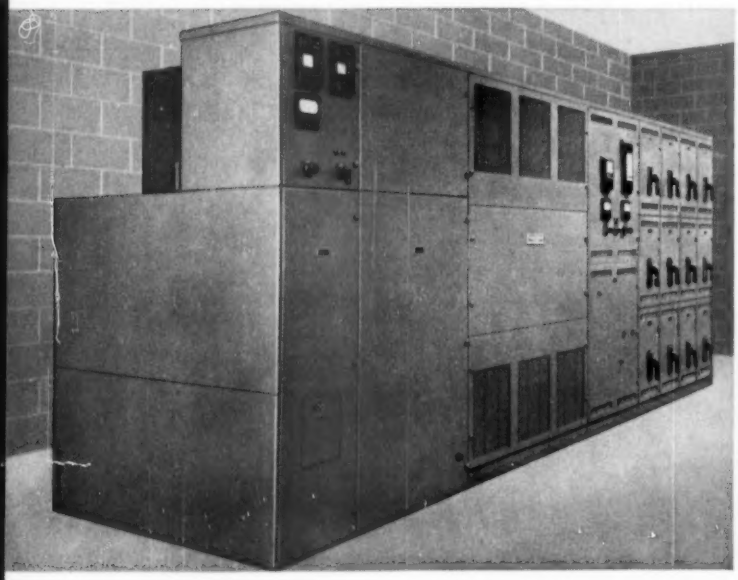
For protection of main incoming lines and feeders. Modern horizontal drawout construction guarantees savings in inspection and maintenance.



600-VOLT DISTRIBUTION SWITCHGEAR

600 volts — 6,000 amperes and below
15,000 to 100,000 amperes interrupting

For protection of low-voltage incoming lines and feeders.



UNIT SUBSTATIONS

300 KVA and above—Primary voltage 480 and above

Coordinated Metal-clad and 600-volt switchgear, plus transformer. Substations reduce distribution losses by stepping down voltage near point of utilization.

INDIVIDUALLY-ENCLOSED CIRCUIT BREAKERS

120-600 volts 10-6,000 amperes
5,000-100,000 amperes interrupting

A complete line of large air (**A**), and molded case (**B**) circuit breakers for protection of single circuits to almost any type of plant equipment.

From power line to production line

. . . I-T-E BOOSTS PLANT EFFICIENCY

From the main plant switchboard to the smallest circuit breaker, I-T-E equipment boosts plant efficiency. Equipment is designed to facilitate efficient power distribution, to guard against overloads and short circuits, and to allow for quick restoration of service in the event of sudden power interruption.

Your plant structure and costly capital equipment are fully protected against electrical hazards at all times. Loads are fed and maintained at proper, efficient voltage. Production lines are kept on the go.

In line with latest thinking, equipment is compact, self-contained—can be located either *indoors* or *outdoors*, according to requirements. Rugged, durable enclosures are available to satisfy every plant need.

Modern design complements modern engineering. Standardized units facilitate expansion. Circuit breakers are easy to get at; maintenance is simple. Breakers can be quickly adjusted to compensate for load changes.

And throughout—safety is the keynote

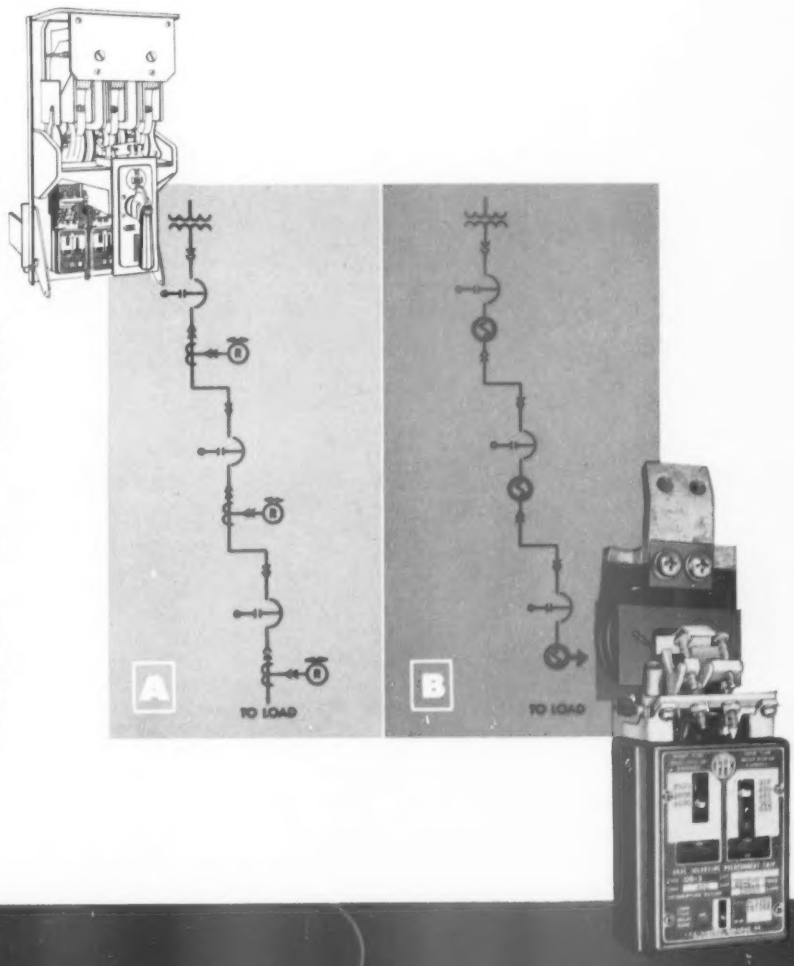
For the *utmost* in service continuity . . . I-T-E *Selective Tripping*

For those 600-volt switchgear applications in which absolute continuity of service is essential, I-T-E offers an advanced selective-trip device which mounts as an *integral* part of the circuit breaker.

By allowing the circuit breaker closest to a fault to open *first*, while other breakers remain closed, the selective-trip device *localizes* trouble. Thus, batch processes and other critical loads are insured against costly and unnecessary shutdown.

Through use of simple, compact I-T-E selective-trip devices, plants can realize an initial cost saving as high as *60%*!

Although Systems A and B (right) provide the same high degree of selective-trip protection, System B actually costs far less to install. I-T-E Direct-Acting Dual-Selective Overcurrent Trip Devices eliminate separate relays, save space, and reduce maintenance.



I-T-E CIRCUIT BREAKER COMPANY

and if DIRECT CURRENT is in the picture...

THE I-T-E MECHANICAL RECTIFIER GIVES YOU HIGHEST EFFICIENCY:

96%—and higher—from a-c line to d-c bus!

THE SAME INCOMING POWER —BUT 10% MORE CHLORINE!

Fields Point Manufacturing Corp., Providence, R. I., credits two I-T-E Mechanical Rectifiers for this substantial boost in production. Here is an excellent source of savings on power costs.

To obtain the highest rectification efficiency possible, I-T-E engineers have:

(1) taken the most efficient method for converting ac to dc—by mechanical switching; and then

(2) designed *equipment* to provide the highest efficiency obtainable with this method.

The result: almost ideal rectification!

A compact unit, easy to install and operate, the I-T-E Mechanical Rectifier gives top efficiency over the low 50 to 400 v. range—and from 25% to 125% of rated load.

The Rectifier is being used to advantage on continuous heavy-current d-c applications—in chlorine manufacturing, metal refining, and on motor load. *Thirty-seven* installed units—more than 200,000 amperes of connected load—prove the point!

FROM COAST TO COAST— STRATEGICALLY LOCATED I-T-E SALES OFFICES STAND READY TO SERVE YOU:

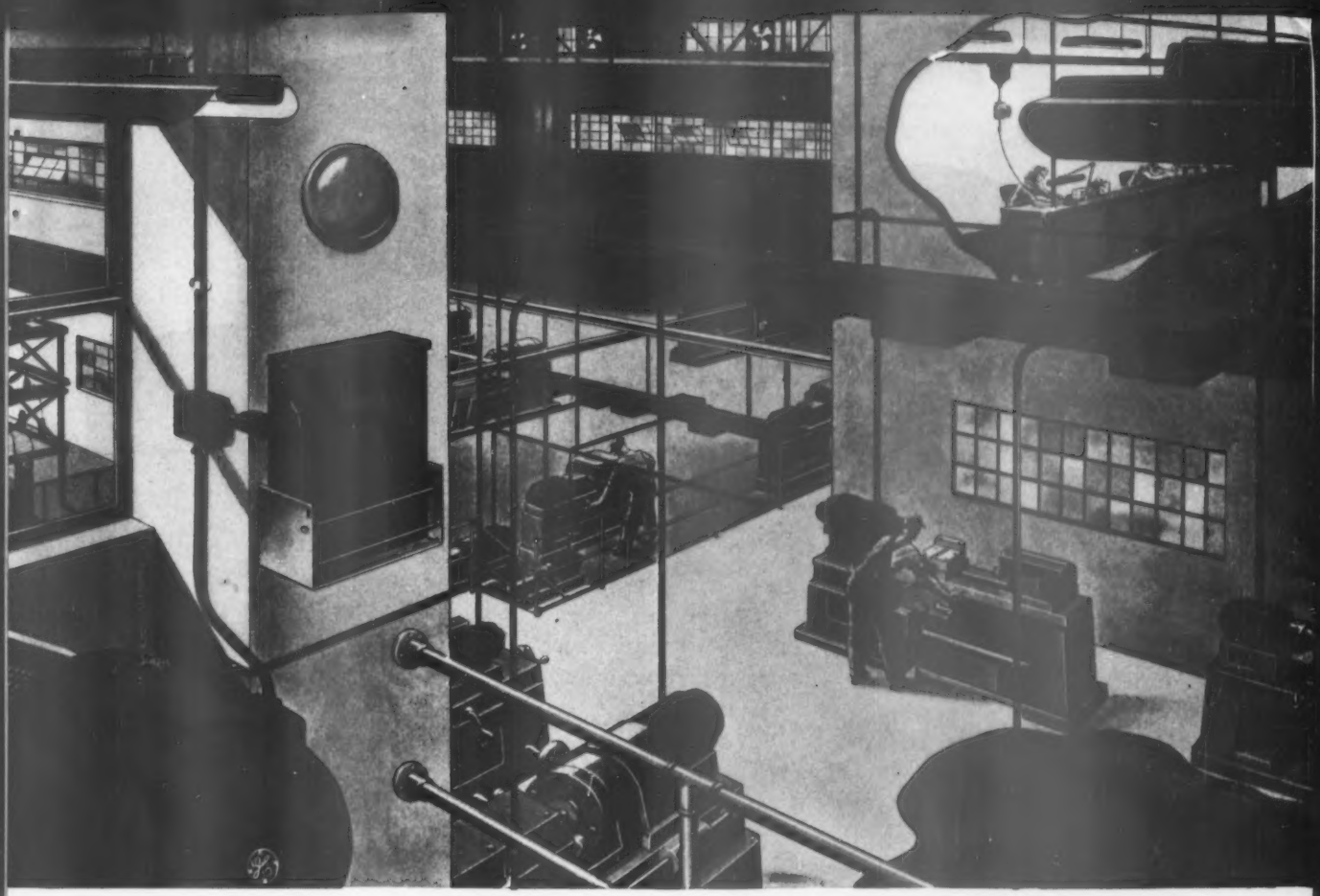
Birmingham, Ala.
Boston, Mass.
Buffalo, N.Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N.C.
Chicago, Ill.
Cincinnati, O.
Cleveland, O.
Dallas, Tex.
Denver, Col.
Detroit, Mich.
El Paso, Tex.
Houston, Tex.
Indianapolis, Ind.
Jackson, Miss.
Jacksonville, Fla.
Little Rock, Ark.
Los Angeles, Calif.
Memphis, Tenn.
Miami, Fla.
Minneapolis, Minn.
New Orleans, La.
N. Kansas City, Mo.
New York, N.Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
San Francisco, Calif.
Santa Fe, N. Mex.
St. Louis, Mo.
Salt Lake City, Utah
Seattle, Wash.
Tucson, Ariz.
Washington, D. C.
Wilkes-Barre, Pa.

I-T-E CIRCUIT BREAKER CO.

19th and HAMILTON STS., PHILADELPHIA 30, PA.

Power Switching Equipment: R&IE Equipment Div., Greensburg, Pa.
Canadian Mfg. & Sales: Eastern Power Devices, Ltd., Toronto
Export Sales: Philips Export Corp., N. Y.

circuit breakers • switchgear • unit substations • isolated phase bus structures • mechanical rectifiers • electronic components • special products.



RADIAL LOAD CENTERS, TRANSFORMERS, CAPACITORS, AND BUS DUCT SYSTEMS contribute heavily toward lowered production costs. Your near-by Graybar Representative will work with you or your electrical contractor in planning a completely efficient power distribution system for your plant.

How modern power distribution systems cut costs

ELECTRICAL CAPACITY DOUBLED without new transformers or wiring when this manufacturer installed G-E capacitors — savings in power costs paid for installation in 3 years. G-E capacitors and other popular G-E power distribution items are distributed nationally by Graybar.

Here are figures hard to ignore in today's drive toward lower production costs:

- **up to 34% more capacity from existing systems**
- **up to 18.5% less shutdown time**
- **up to 50% savings on power costs**
- **up to 150% annual return on your investment**

Powerful statements, to be sure, but still *facts* that can be backed up with actual case-history proof by your local Graybar Representative.

If you face the problem of designing a new power distribution system – or of forestalling major rewiring through increased efficiency of an existing system – then, *now* is the time to call Graybar.

It's just as costly to plan for, install and service inferior, misfit equipment as it is to do the same with quality items custom-fitted to your particular needs. Graybar Power Specialists have proved it for customers the nation over – let them prove it to *you*.

As distributor of over 100,000 different electrical items made by 200 leading manufacturers, you can always be sure of carefully-considered, impartial recommendations. It's the common-sense result of ordering everything electrical via *a single source . . . a single* responsibility. *Graybar Electric Co., Inc. Executive Offices: Graybar Building, 420 Lexington Avenue, New York 17, N. Y.*

338-115

Call Graybar first for...

Graybar Everything Electrical

IN OVER 100 PRINCIPAL CITIES

Here's why most control center buyers specify Westinghouse

Why this mass preference? It all boils down to matching product to need. Close co-operation with industry, exhaustive tests and constant improvement have produced this control center which matches industry's every need. Here are the product features that make Westinghouse Control Centers the MOST PREFERRED control centers:

FLEXIBILITY

Westinghouse Control Centers have complete flexibility to match the periodic movement, substitution and addition of machines—flexibility of electrical components—flexibility of structural units. All cubicle units are built to a standard 14″ module—are completely interchangeable. Vertical structures are standardized and free-standing—can be moved or added at any time.

EASIER SERVICING

There is no maze of mechanical obstacles on a Westinghouse Control Center. A few twists of a screw driver and your serviceman is ready to go to work. Guide rails simplify removal and insertion of cubicles. All starter units are front wired. Side baffles are removable for easier wiring. Sectional and master terminal boards speed hook-up work.

POSITIVE SAFETY

Westinghouse Control Centers protect *both* personnel and equipment. The Westinghouse "Magnagrip®" stab connectors and tilt-out disconnect position assure a "dead" unit for servicing. Unit door remains on structure to cover hot buses when starter unit is removed. Tested baffling prevents explosive chain reactions if faults occur. Each starter has an interrupting capacity of not less than 15,000 rms amps.

Complete details on these and other important features are contained in the Control Center Booklet B-4213. Ask for your free copy. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-27021-A

YOU CAN BE SURE...IF IT'S

Westinghouse

WHY RISK SHUTDOWNS?

WESTINGHOUSE INVENTORY PLAN GIVES YOU THE ELECTRONIC TUBES YOU NEED WHEN YOU NEED THEM

Switch from the old-fashioned method of searching for tube replacements — make sure you have 'em at your finger tips.

Production stoppages can be avoided. Here's how —

A reliable Westinghouse distributor will inventory your equipment and analyze your tube needs. He will prepare an ideal stocking plan. He will maintain a stock reserve specifically for you in his warehouse. This personalized stock is over and above your normal inventory of spare tubes you maintain for emergency breakdown.

Your Westinghouse distributor provides immediate service. In case of emergency, a call to him will bring your personalized tube replacement in a matter of minutes.

Why risk production losses any longer? Accident may strike today . . . tomorrow. Take advantage of the Westinghouse Inventory Plan as soon as possible. Call your Westinghouse distributor or write Dept. F-105.

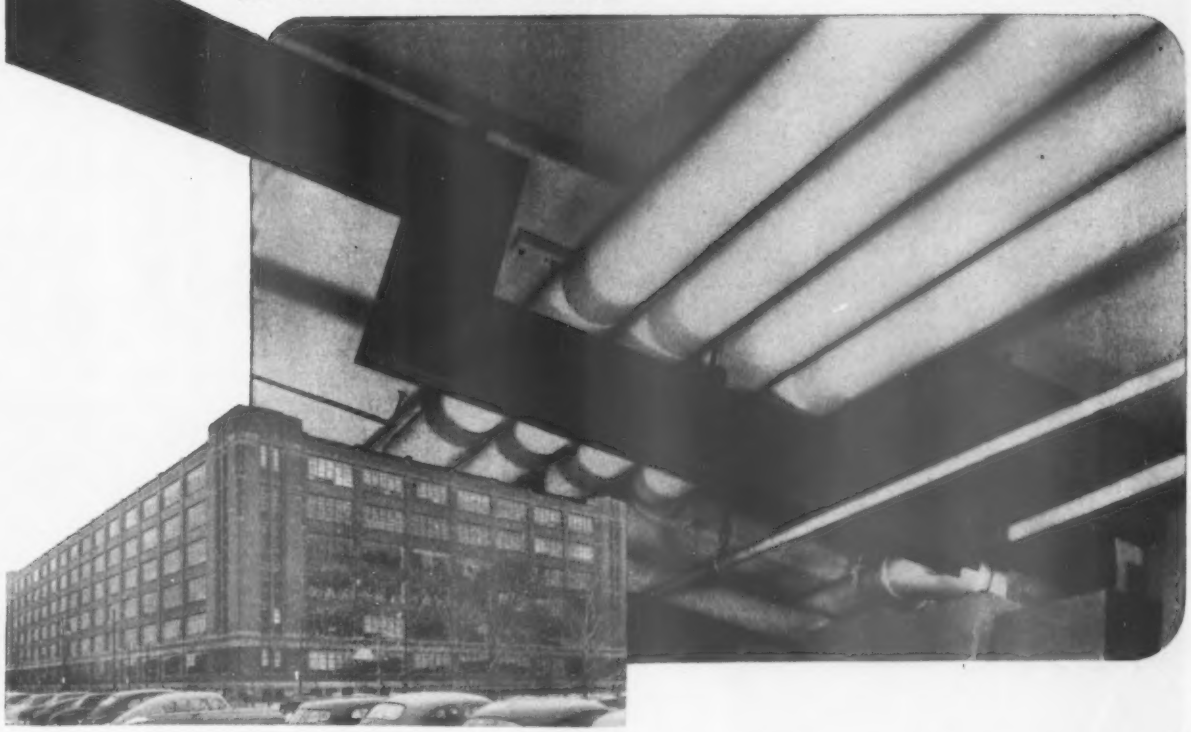
YOU CAN BE SURE... IF IT'S Westinghouse

ET-95017

RELIATRON™ TUBES

WESTINGHOUSE ELECTRIC CORPORATION, ELECTRONIC TUBE DIVISION, ELMIRA, N. Y.

BUS DUCT IS FLEXIBLE



Parke, Davis & Company plant modernizes with Westinghouse Bus Duct

"Neat . . . clean . . . flexible!", say Parke, Davis & Company engineers about the installation. The contractor reports, "My men liked installing Westinghouse Bus Duct . . . and the ease of mounting it around pipes, through walls and across wide open spaces saved us considerable time and money."

This vast installation of standardized Low Impedance and Plug-In Bus Duct has recently been completed at the Parke, Davis & Company, Detroit, Michigan, where a complete changeover was made from a d-c to an a-c system.

This duct has greater current-carrying capacity pound for pound than any other means of secondary power distribution. Plug-In Duct has outlets every foot to allow for rapid machine tie-ins. Duct sections are fully salvageable and can be expanded or relocated with little effort.

Four types of Westinghouse Bus Duct are available to meet any load condition and service requirement. Call your Westinghouse Representative for complete details or write for B—5835, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-30107-A

YOU CAN BE SURE... IF IT'S Westinghouse

BUS DUCT

The case of downtime cut 98%

By Westinghouse Circuit Breakers on normal overload interruptions

Three-shift electrical protection is critical today—critical in sustaining full production, critical when maintenance men may not be instantly available to restore power when unpredictable outages occur. Downtime can lick you.

One manufacturer* definitely determined that in one year downtime, due to fuse outages, cost him over $5000. This is more than 50 times what circuit outages have since cost—after he installed Westinghouse Circuit Breakers.

Why? Because Westinghouse Circuit Breakers trip on dangerous overloads and short circuits only—while cutting *your* unnecessary downtime three ways. One: they will not rupture on temporary, harmless overloads. Two: when the line is cleared after a heavy overload interruption, power is restored simply by a flip of the handle; there is nothing to replace, no running after fuses or hunting up maintenance men. Three: there is no danger of over fusing or under fusing; they preserve precise calibration throughout the life of the installation.

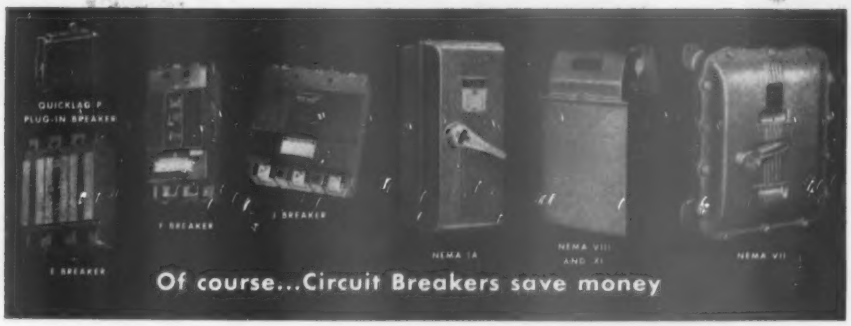
Westinghouse Circuit Breakers are built to be forgotten. They give years and years of the most modern protection for both circuits and equipment. Find out what unnecessary downtime is costing you—in idle men, in idle machines, lost production.

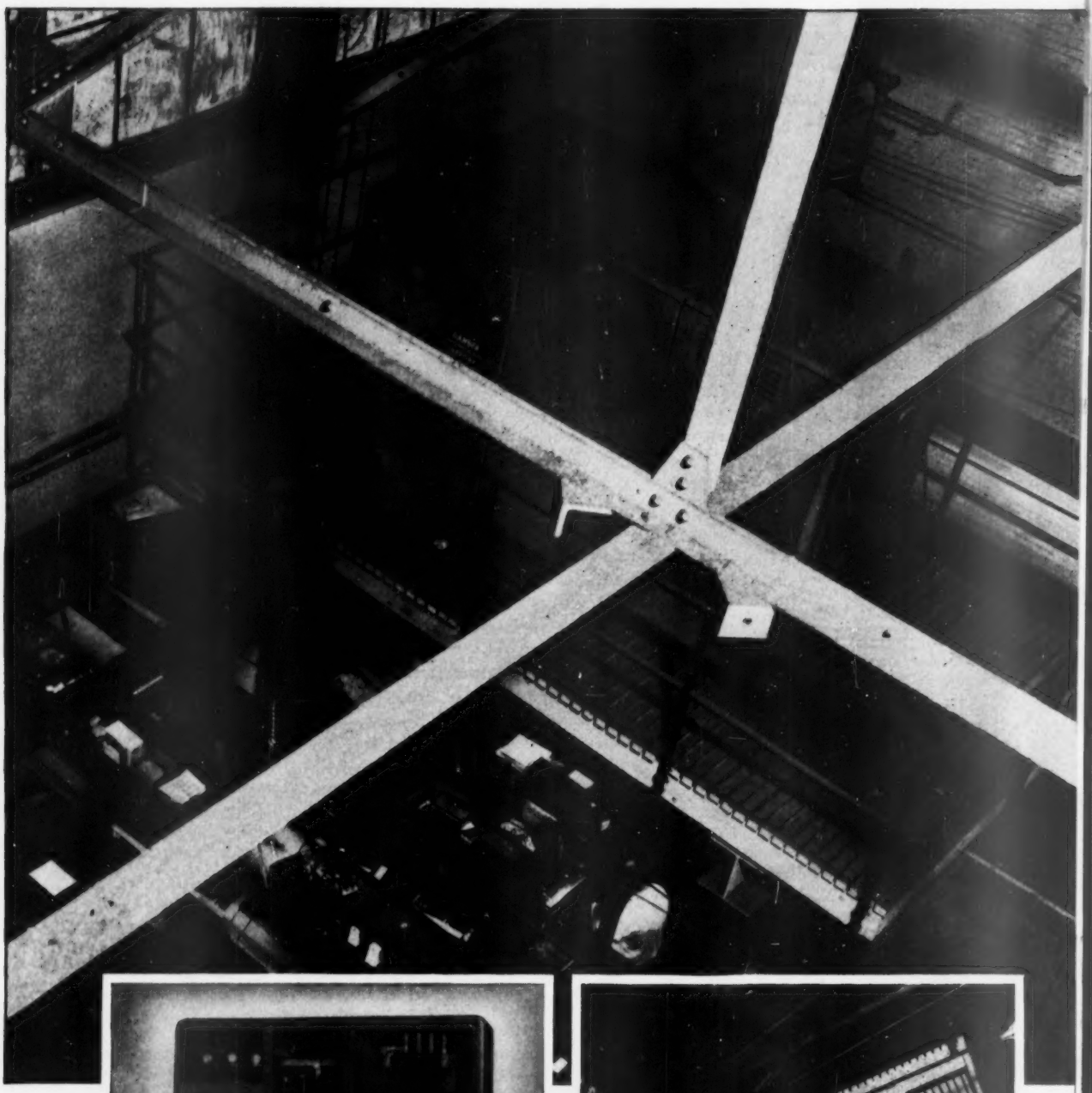
Be circuit breaker sure! For complete information, call your Westinghouse Distributor, or write for Booklet B-5407 on AB Circuit Breakers or Booklet B-5456 on AB-I Circuit Breakers, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-30131

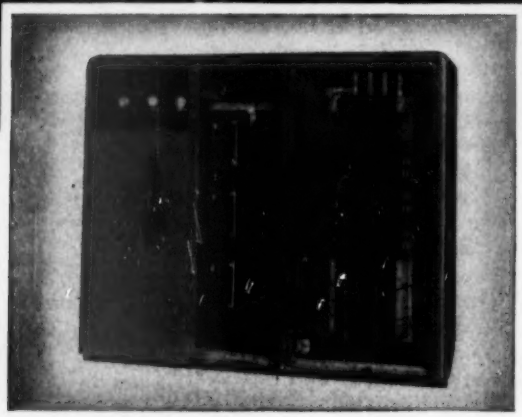
**Name of company on request*

SE
SED

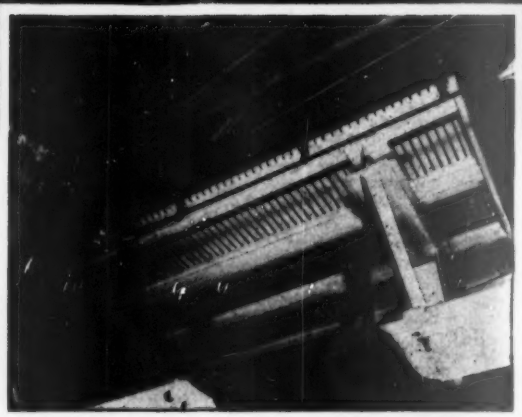
YOU CAN BE SURE...IF IT'S
Westinghouse







BUILT-IN PROTECTION **Separately mounted protective devices are eliminated. Factory-assembled Westinghouse Power Centers offer complete substation protection.**



EASY TO INSTALL **Floor view of completely enclosed unit. Westinghouse Dry-Type Power Centers are safe . . . to hook up, simply connect high and low-voltage leads.**

How Westinghouse Power Centers release space for production

Confronted with the need to modernize his electrical distribution system, an eastern radio and electronics manufacturer installed four Westinghouse Dry-Type Power Centers on overhead platforms, releasing much needed floor space for production.

Change-over from the old system was accomplished section by section, without interrupting production. Each 300-kva integral Power Center, completely assembled, was spotted overhead, close to the center of the load it would serve. Secondary runs were thus shortened, resulting in lower line losses, better regulation, and increased productive capacity of the machinery.

As the old conventional equipment in floor-level vaults was dismantled, additional productive equipment was moved in. The entire change-over was accomplished in 60 days.

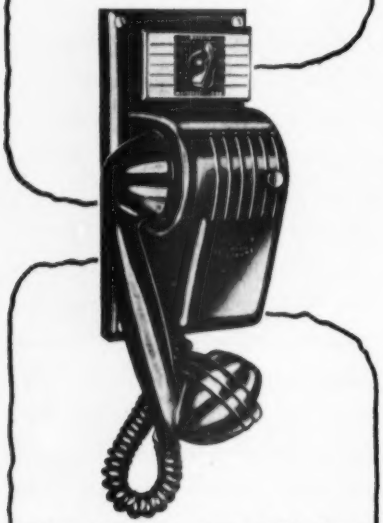
Westinghouse Dry-Type Power Centers can bring savings like this to your plant, too. With all protective equipment factory co-ordinated and assembled as a unit, they can be installed quickly and easily. Air cooled, they are safe and eliminate most maintenance headaches. For further information, contact your Westinghouse representative, or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh, Pennsylvania. J-70655

YOU CAN BE SURE...IF IT'S Westinghouse

OUTLYING
PLANT LOCATIONS
INSTANTLY ACCESSIBLE

Quickly... easily... install

WHEELER
SOUND POWERED
Electric
TELEPHONES



Write for information on this thoroughly tested and proved intercom equipment that operates WITHOUT BATTERIES or outside power source ...requires no maintenance...is always dependable IN EMERGENCY. LOW first-and-last cost. No electrical hazards. Handsets, Pair Phones, or complete intercom.

the **WHEELER**
INSULATED WIRE CO., INC.
DIVISION OF THE SPERRY CORP.

1110 EAST AURORA STREET
WATERBURY, CONNECTICUT

28WHBRC

IMPORTANT NEW *Free* CATALOGS

Begins on page B-266

ELECTRICAL DISTRIBUTION

OTHER SECTIONS:
Building & Grounds Page B-40
Plant Services . . . B-108
Materials Handling . . B-344

162 Power Distribution In this 16-page catalog (No. 25C7012C) you'll find information on power generation and distribution equipment. Sections on switchgear, switchboards, rectifiers, other equipment. Allis-Chalmers Mfg. Co.

163 Unit Substations Load center unit substations are subject of this 16-pager. Illustrated charts and tables explain power control, breaker sizes, and voltage reduction. Tells how to select and plan for plant needs. Catalog No. 11B6285A. Allis-Chalmers Mfg. Co.

164 Unit Substations In this 16-page catalog, you'll find features and applications of power conversion units. Describes typical arrangements and components. Makes comparison between two types of motor-generator conversion units. Catalog No. B-4239. Westinghouse Electric Corp.

165 Power Centers This 35-page catalog tells what power centers are and how you can use them. Describes the equipment and components. Sections on networks and switchgear. Catalog No. B-4162. Westinghouse Electric Co.

166 Packaged Power Units Here's a 24-page catalog (No. GEA-5600) on features, selection, and installation of unitized power distribution equipment. Tells how to plan and install the power units. General Electric Co.

167 Load-Center Distribution Radial or secondary selective load-center distribution systems get the spotlight in this 12-pager (No. GEA-5896). Description of each type, advantages, series of eight case studies. Photos illustrate the equipment. General Electric Co.

168 Power Distribution A 28-page "idea book" tells you how to get the most out of your power distribution equipment. You learn how to select economical unit substation size and lots more. Catalog No. GEA-5900. General Electric Co.

169 Electrical Tapes Tapes for electrical construction and maintenance in this 12-pager. Tells how to use four types of tape and several accessories. Charts give tape properties. Catalog No. E-CMBR. Minnesota Mining & Mfg. Co.

170 Transformers Application and installation data in this 12-page bulletin on air-cooled dry-type transformers. Spec tables and diagrams illustrate. Bulletin No. AC 185. Acme Electric Corp.

171 Transformers Catalog on transformers for mercury vapor lamps, power circuit transformers, and control transformers is subject of three bulletins. Describes dimensions, mountings, wiring. Installation information included. 39 pages. Jefferson Electric Co.

172 Transformers Specs and applications on dry-type transformers in this

To get these catalogs, circle number on reader's service postcard next to back cover.

To get these catalogs, circle number on reader's service postcard next to back cover.

It can't get too corrosive for Rome Synthinol® 901

Thermoplastic Insulated Wire and Cable

For the wiring of plant branch and feeder circuits, where corrosive materials or fumes are prevalent, it will pay you to specify Rome Synthinol 901.

Being a specially compounded, resin plasticized, polyvinyl chloride type of insulation, Rome Synthinol 901 has exceptional resistance to corrosive fumes, chemicals, oils, greases, moisture and heat deformation. In addition, it is uniformly small in diameter, permanently colored and easy to pull.

It is ideally suited for wiring in chemical plants, oil refineries, as well as paper and steel mills . . . in fact, most installations where conditions are difficult.

Underwriters' Approved as Type TW

Rome Synthinol 901 is approved by Underwriters' Laboratories, Inc., as Type TW, for 60°C. operation, under the National Electrical Code. Further, being resin-plasticized and highly resistant to heat, Rome Synthinol 901 provides you with a far greater safety factor at elevated temperatures than does regular Type TW.

It Costs Less to Buy the Best

ROME CABLE
Corporation
ROME · NEW YORK
TORRANCE · CALIFORNIA

ROME CABLE ROME, N.Y.

Compare The Penalties of Poor Plant Communication

If any of the following conditions exist in your plant, you are needlessly paying the high price of inadequate plant communication.

Poor Liaison between Production Control and Manufacturing Departments.

Delays in delivering incoming materials to stock—or manufacturing areas.

Slowness in getting "hot items" to waiting departments.

Long intervals between laboratory analyses and receiving the report in the departments concerned.

Scrap losses resulting from poorly handled quality control procedures.

Confusion in processing areas concerning raw materials and semi-finished part availability.

Subassembly and raw materials build up due to lack of information in processing areas.

Unsatisfactory customer service due to sketchy information from Production Control (and processing departments).

Wasted personnel time in chasing down data that should be immediately available.

Heavy "down time" and production loss through uncoordinated maintenance control.

Disjointed accounting procedures due to improper follow-up.

All the above and more, are expense producers in the forms of expeditors, messengers, phone calls, lost time of production personnel, "down time", annoyed customers, low output rate.

If these manufacturing problems exist—and they do—they could exist in your plant. A member of our staff is at your service to aid in analyzing your communication problems.

Literature is available upon request. It will aid us to send you the most useful literature if you mention your specific problem(s). Write Dept. B-35.

*Trade-Mark

Telescriber TelAutograph Service

TelAutograph CORPORATION

16 West 61st Street • New York 23, N. Y.

Free NEW CATALOGS

Begins on page B-266

catalog (No. B-4009). Illustrates several models. 12 pages. Westinghouse Electric Corp.

173 Voltage Regulators
Illustrates and describes three types to meet urban substation needs. Sections on electrical controls, other construction features. 4 pages. Catalog No. B-4736. Westinghouse Electric Corp.

174 Switchgear
Heavy-duty metal - clad switchgear is subject of this 54-pager (No. B-5306). Facts on maintenance, wiring, and installation for both indoor and outdoor types. Specs included. Westinghouse Electric Corp.

175 Switchgear
You'll find selection information on unitized low-voltage metal-enclosed switchgear in this 30-page catalog (No. B-5282). Applications and construction features. Westinghouse Electric Corp.

176 Motor-Generators
Here's a 50-page reprint from a standard reference handbook. Can help you select motive power to handle most industrial applications. Allis-Chalmers Mfg. Co.

177 Raceways, Fittings
Dimensions, descriptions, and wire capacities on a full line of raceways and fittings in this 120-page pocket-size catalog. Installation data. The Wiremold Co.

178 Underfloor Power Distribution System
Describes a light-gage sheet steel formed into structural sections

To get these catalogs, circle number on reader's service postcard next to back cover.

Free NEW CATALOGS

and wire raceways. Gives capacities, describes installation. 8 pages. Bulletin No. BP-11. Detroit Steel Products Co.

179 Trolley Busway In Catalog No. 30 you get features on maker's heavy-duty trolley busway electric power distribution system. Design and construction details. Tells how to plan your own installation. 16 pages. Feedrail Corp.

180 Cables Bare, weatherproof, power, and control cables are subjects of these two catalogs. Specs, application, and engineering information. More than 100 pages. Rome Cable Corp.

181 Bus Duct This catalog on plug-in bus duct tells how to select, install, and use. Specs and construction details. Bulletin No. BD-755. Bulldog Electric Products Co.

182 Bus Duct Tells how you can modernize your electrical distribution system with bus duct. Shows how you can increase flexibility of building layout and machine tie-ins. Specs on four models. 12 pages. Catalog No. B-5835. Westinghouse Electric Corp.

183 Armor Cable You learn how you can use maker's interlocked armor cable in this 20-pager. Selection and installation information. General Electric Co.

184 Power Cable Here's a 16-pager on power cable. Gives physical and elec-

To get these catalogs, circle number on reader's service postcard next to back cover.

With The Rewards of Good Plant Communication

The cost reductions of telescriber controls are available to you for your present plant and should be considered in your expansion plans.

Incoming Materials Handling: 'Instan-Form' communication from Receiving to Production, Accounting, Purchasing, Storage and Warehouse instantly delivers receiving tickets to all concerned.

Production Control: Telescribers in processing departments and Production Control transmit production orders, changes, requests, etc. to all outlying departments simultaneously on a preprinted move ticket.

Quality Control: Laboratory promptly telescribes reports to sections waiting for analyses. Changes in production — or continuation of unchanged operations—are effected without loss of time.

Materials Handling: (work-in-progress) Each processing area telescribes inter-area materials flow information. All departments are constantly aware of material locations. A monitor receiver keeps Production Control up-to-the-minute on all moves.

Sales Order: To maintain good customer service, a telescriber network between Production Control and Sales Order Department (and in turn the network between Production Control and outlying departments) provides information in writing, at a reliable, rapid pace.

Maintenance: The more automation in the plant, the greater need for effective maintenance. Work orders telescribed instantly from Maintenance Control Office to outlying maintenance office eliminate slow messenger delivery. All maintenance areas operate out of their own local office.

Write for the book "The Nerve System of Controlled Manufacturing is Communication." Address your request to Dept. B-35.

*Trade-Mark

Instan-Form* TelAutograph* CORPORATION
16 West 61st Street • New York 23, N. Y.

HERE'S A TESTING INSTRUMENT NO PLANT CAN AFFORD TO BE WITHOUT...

"The Industrial"

MULTI-AMP MODEL #1010

At last . . . a portable, high current testing instrument that makes it possible to check and calibrate current actuated devices to make sure they are really protecting. Low in cost, economical, and simple to operate, the Multi-Amp makes sure you're safe. Its use can mean the difference between continuous operation or idle production lines.

Cut down on motor failures, short circuits, electrical fires and other work-stoppers. Let the Multi-Amp help keep your production lines humming.

NEW FREE BOOK

Just off the press! New booklet tells how to avoid the losses in time, equipment and production caused by electrical overloads, motor failures, short circuits and electrical fires. Write for free copy now.

MULTI-AMP CORPORATION, HARRISON, N. J.

NEW Free CATALOGS

Begins on page B-266

trical properties, information on splicing and terminating. Application data included. General Electric Co.

185 Plastic Pipe Applications for flexible, semi-rigid, high-impact, rigid polyvinyl chloride plastic pipe in this 16-pager. Installation and dimension data. Section on fittings. Triangle Conduit & Cable Co., Inc.

186 Cable Conduit An 18-page catalog (No. 51) on conduit for cable protection. Application and installation data. Engineering drawings and dimension tables. Orangeburg Mfg. Co., Inc.

187 Plugs Tells how to adapt for use on motors and heavy-duty signal and control circuits. Application tips on the plugs and receptacles. Selection chart included. 12 pages. Bulletin No. M3-1952. Cannon Electric Co.

188 Limit Switches Specs, ratings, and operating features of heavy-duty precision limit switches in catalog No. 82. Tells where to use each of many types. Technical data section is included. 24 pages. Micro-Switch.

189 Fuses Here's a 24-pager on selection of protective devices for electric circuits, motors, appliances, and other apparatus. Charts and tables illustrate performance data. Form No. SPD 51. Bussman Mfg. Co.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover, Part Two.

This EC&M Braking Panel replaces all mechanical braking devices in southern fertilizer plant and operates satisfactorily in severe acid atmosphere.

Change-Over to Dynamic Braking Control by EC&M Results in Smoother, Safer Operation of Bucket Cranes

Dynamic Braking Bridge-Stop Control provides an all-electric braking system in which the **driving** motor also acts as the **braking** motor. Operator applies normal stopping by means of a 2-position foot switch which gives two points of dynamic braking depending upon the speed of the crane and the accuracy of stopping desired. Should power fail, dynamic braking is automatically applied to bring the crane to rest quickly, regardless of the position of the master switch.

SOMETHING had to be done! One of the cranes in this plant had partially jumped the runway when power failed at instant of plugging. Ordinary braking methods failed. Magnetically-released, mechanically-set brake wore down rapidly under hard service. Motor burnouts, shaft and gear failures spelled costly delays. Repairs were a nightmare.

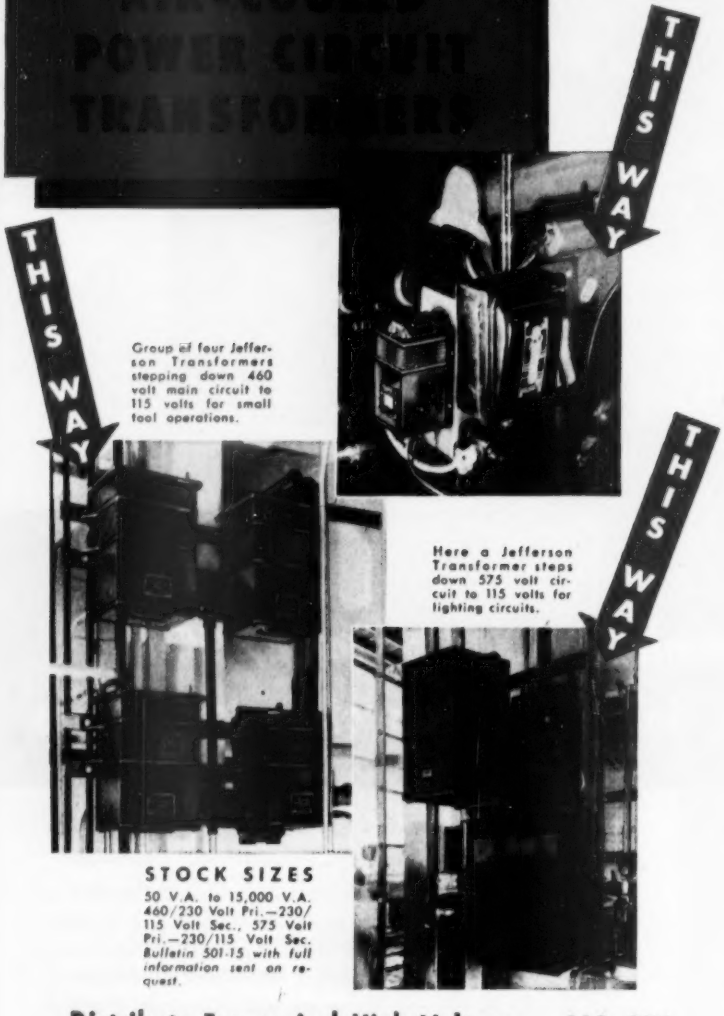
So, a change-over was made to all-electric braking. This eliminated costly production delays. Maintenance became merely a routine inspection of motors and controllers. Operation became 100% satisfactory. And the operators warmed up to the smoother stopping.

Dynamic Braking Bridge-Stop Control offers advantages for your cranes. May we send you Bulletin 921-6.0?

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET ★ CLEVELAND 4, OHIO

JEFFERSON



Jefferson Transformer mounted directly on machine tool stepping down 230 volt main circuit to 115 volts for machine lights and controls.

Group of four Jefferson Transformers stepping down 460 volt main circuit to 115 volts for small tool operations.

Here a Jefferson Transformer steps down 575 volt circuit to 115 volts for lighting circuits.

STOCK SIZES

50 V.A. to 15,000 V.A. 460/230 Volt Pri.—230/115 Volt Sec., 575 Volt Pri.—230/115 Volt Sec. *Bulletin 501-15 with full information sent on request.*

Distribute Economical High Voltage...460-575
Provide Low Voltage Only Where Needed...115-230

High voltage power distribution provides greater volt-ampere capacity with no increase in copper wire and steel conduit sizes. You save materials, wiring costs, maintenance costs, installation time and eliminate duplicate wiring.

Jefferson Power Circuit Transformers can be mounted directly on or adjacent to machinery or wherever low voltage is required. Air-Cooled "Dry Type" construction makes Jefferson Transformers exceptionally compact and easy to install. Ample wiring compartments and *both* ½" and ¾" knockouts are provided for rigid or flexible conduit connections.

Approved by Underwriters' Laboratories, Inc.

JEFFERSON ELECTRIC COMPANY
Bellwood, Illinois

Jefferson Transformers

Free NEW CATALOGS

Begins on page B-266

190 Fuses
In this 24-page catalog you get technical data on a line of fuses — specs, operating, and maintenance information. General Electric Co.

191 Code Call Systems
This 6-page bulletin lists industrial applications of the system. Schematic drawings show how you can install it in your plant. Bulletin No. 4B. Wheelock Code Call Signal Engineering & Mfg. Co.

192 Phone System
A dial intercommunication system is feature of this 4-pager. How it works, installation and maintenance data. Select-O-Phone Div., Kellogg Switchboard & Supply Co.

193 Two-Way Radio
Tells how and when you can use it to improve communication in your plant. Describes and illustrates typical installations. 12 pages. Mobile Communications Section, Radio Corp. of America.

194 Phones
You learn about applications for sound-powered electric phones in this 6-pager. Illustrates three different models, tells how to install and where. The Wheeler Insulated Wire Co., Inc.

195 Telephone System
Describes several variations of maker's inside telephone systems. Outlines principles and applications, gives selection data. Circular No. 1737. Automatic Electric Sales Corp.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover, Part Two.

CHANGE ONLY THE CABLE TO INCREASE CURRENT CAPACITY–30–50%

...WITH

ROCKBESTOS AVA

When electrical loads outgrow their cables, don't tear out old conduit, then buy and install new. To increase capacity, replace "RH" with Rockbestos AVA (AVC) — the cable that carries more current, size for size.

Not only do you save by putting Rockbestos AVA into existing *conduit*, but you make additional savings in labor, copper, and steel.

Used in *new* installations, you wire-in extra-capacity for future load growth, or unusual demands, with this greater-current-carrying cable.

And because it's a better insulated cable, you get more years of dependable service, too. Write for booklet "Cut Current Carrying Costs."

Inner Felted Asbestos Wall
Varnished Cambric
Outer Felted Asbestos Wall
Hi
...Your best buy
It's the A.V.C. A.V.C.
"Sandwich" that makes the difference. The "sandwich" protects the varnish cambric. It enables A.V.C. to carry more current than cables with conventional insulations.

ROCKBESTOS

PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO
PITTSBURGH • ST. LOUIS • LOS ANGELES
OAKLAND, CALIFORNIA • NEW ORLEANS •
SEATTLE

Keep Power Flowing with RoZone-RoPrene® cable

Material shortages and tight controls are bad enough. When you add to them the "down time" cost of idle plant equipment, resulting from power failure, you've really got a "headache."

You can save yourself this kind of a "headache" by standardizing on RoZone-RoPrene for your plant power distribution system. How? Because you get *double protection* against failure. First, the insulation, RoZone, is a *premium* oil-base compound made for high quality and dependable performance. It has high dielectric and impulse strength. And, it's immune to the effects of aging, heat, sunlight and moisture. Further, where high voltages are involved, it is exceptionally resistant to the effects of corona and ozone cutting. Second, the tire-tough RoPrene (Neoprene) sheath has superior resistance to abrasion, oils, acids, alkalies, flame, moisture.

A rugged cable, RoZone-RoPrene is designed to keep power flowing even under the toughest conditions in paper mills, steel mills, chemical plants . . . any installation where dependability and long life are of utmost importance. It is available as single or multiple conductor for service ratings up to 8000 volts. It may be installed direct in earth, in conduits, aerially . . . or in circuits combining all three.

The Rome Power and Control Cable Catalog will show you how you can save purchasing "headaches" with RoZone-RoPrene Power Cables. Mail the coupon today for your copy.

It Costs Less to Buy the Best

*T. M. REG.

ROME CABLE CORPORATION, DEPT. F-5, Rome, N. Y.

Please send me a copy of the Rome Power and Control Cable Catalog.

Name ..... Title .....

Firm ..... Address .....

City ..... Zone ..... State .....

ROME CABLE
Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

ROME CABLE ROME, N.Y.

Free NEW CATALOGS

Begins on page B-266

196 Telescriber System
File-folderful of brochures on maker's telescriber system suggests many plant applications. Maintenance, operating, and installation information. TelAutograph Corp.

197 Control Centers
A 28-pager on multi-unit control centers. You learn what they are, why you should use them. Specs, installation information. Bulletin No. 798. Allen-Bradley Co.

198 Lighting Controls
Bulletin No. 801 tells where to use maker's lighting controls system, describes components, and gives schematics of installations. 32 pages. Frank Adam Electric Co.

199 Switchboards
In Bulletin No. 502 there's information on a universal-type switchboard. Several types illustrated and described. Construction detailed, suggested specs, layout data. 26 pages. Bulldog Electric Products Co.

200 Valve Control
Equipment for controlling valve operation in this 26-pager. General information, specs, engineering data, charts, and application information. Cutler-Hammer, Inc.

201 Electrician's Tools
Illustrations, specs, and applications for a full line of electricians' and mechanics' tools. Engineering reference data, other useful information. 86 pages. Catalog No. 50. Mathias Klein & Sons.

To get these catalogs, circle number on reader's service postcard next to back cover, Part Two.

HAVE YOU TRIED THIS FINEST OF PLASTIC TAPES?

PLYMOUTH PLASTIC *Electrical* TAPE

PACKED INDIVIDUALLY
One 66-ft. roll, ¾" width in single pocket-size metal can

CONVENIENT FIVE-PACK
Five 30-ft. rolls, ¾" width in handy container

RECOMMENDED IN PLACE OF FRICTION AND RUBBER TAPES IN THE FOLLOWING SITUATIONS:

1. Where tape is subject to abrasion (resists abrasion).
2. Where space is limited (makes neater job, as in terminal box).
3. Where tape is subject to water, acids, alkalies, corrosion (resists all).
4. Where time must be saved (does the job much more quickly).

PLYMOUTH RUBBER COMPANY, INC.
Manufacturers of SLIPKNOT — The World's Largest Selling Friction Tape
CANTON, MASS.

the most important contribution to interior communications since the perfection of **KELLOGG**

SELECT-O-PHONE, America's *first choice* in intercommunication systems, augments city 'phone service, relieves switchboards so jammed with inside, inter-office traffic that they cannot handle incoming and outgoing calls efficiently. SELECT-O-PHONE is automatic, requires no operator, handles communication between as many as 55 stations! . . . The *new Executive Station*, with automatic dialing and ringing, permits you to converse with up to 20 other stations or departments as though in the same room. No buttons or levers to hold down while you talk. Simple 4-wire installation. For complete information send coupon below at once.

Select-O-Phone

. . . the New EXECUTIVE STATION

KELLOGG AT&T

An Associate of International Telephone and Telegraph Corporation

Mahogany, walnut or finished to blend with any office decor.

SELECT-O-PHONE DIVISION, KELLOGG SWITCHBOARD AND SUPPLY CO., Dept. 12E
Sales Offices: 79 W. Monroe St., Chicago 3, Illinois
Please send information on Kellogg SELECT-O-PHONE Systems and the new Executive Station.

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE ____ STATE _____

Key personnel in any organization leave their desks frequently to keep things moving in other departments of the company. But each member of the group must be within reach at all times since they constitute the chief "players" of the management team.

The Wheelock Code Call makes it possible for the telephone operator to locate someone by merely pressing a button which controls a network of signals throughout plant, factory, or offices. When the employee hears the signal he or she responds via the nearest phone. Thus, instant contact is established and valuable "searching" time is saved.

The Wheelock Code Call is easy to install and various combinations of chimes, bells and horns are available.

Write for Bulletin B4-F

Engineering Representatives in Principal Cities.

Wheelock CODE CALL
SIGNAL
ENGINEERING & MFG. CO.
154 WEST 14th ST. NEW YORK 11 N.Y.

Reconditioned INTERCOMS

with New Equipment GUARANTEE!

for . . . BUSINESSES, FACTORIES, INSTITUTIONS AND MANY OTHERS

COMPLETE SYSTEMS for as little as $19.95

Manufacturer will sacrifice nationally known TALKATRON, 2-way talking, 2-station intercommunication sets, regularly selling for $40.00 direct from manufacturer for $19.95 while they last. Small compact units, housed in handsome gray wrinkle, sturdy steel cabinets. Completely rebuilt and reconditioned. New tubes and parts. Carries same written guarantee as new equipment. Operates on AC or DC. Easy to install. High amplification. So sensitive, it picks up a whisper or even the drop of a pin. Transmits voice clearly and distinctly. Can be operated at distance of ½ mile.

Units can be used in systems of 2 to 100 stations. 2-station set with instructions and guarantee, $19.95 FOB Chicago factory. Inside 3-conductor wire designed for equipment 5¢ per foot. Outside wire 8¢ per foot.

New equipment available at slightly higher prices. Public address or paging system, including amplifier, microphone and big 8" speaker, as little as $39.95 complete.

CAMBRIDGE CO., 2561 N. Clark St., Chicago, EA 7-4410

FILM PROGRAM OF THE MONTH

ELECTRICAL DISTRIBUTION

Other film programs will be found on the following pages:

BUILDINGS & GROUNDS....page B- 56
PLANT SERVICES..... B-138
MATERIALS HANDLING..... B-344

"HINTS FOR HANDLING ALUMINUM CONDUIT, WIRE, AND CABLE" offers suggestions for handling aluminum wiring equipment. 10 minutes, sound. Write:

Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19.

"INSTALLING ARMORED CABLE" shows how to install and use armored cable. Although the demonstration is in a home, the information is of use to industrial people. 27 minutes. Write:

National Electrical M/rs. Assn., 155 E. 44th St., New York 17.

"MODERN INDUSTRIAL POWER DISTRIBUTION" outlines the advantages of the load-center system in power distribution and its application to industrial plants. 27 minutes, sound-slidefilm. Write:

General Electric Co., 1 River Road, Schenectady, 5, N. Y.

"SELECTING THE RIGHT INDUSTRIAL DISTRIBUTION SYSTEM" illustrates and explains 11 types of power distribution systems used in industry and the six major characteristics on which they're rated. 20 minutes, color. Write:

Westinghouse Electric Corp., Box 868, 511 Wood St., Pittsburgh.

"SITTIN' AND 'SAVIN'" explains how capacitors cut industrial power costs when inductive equipment is being used. There is a revised version of this sound-slidefilm for use in areas where a utility power factor clause or the equivalent is not in effect. 13 minutes, color. Write:

General Electric Co., Advertising & Sales Promotion Dept., 1 River Road, Schenectady 5, N. Y.

You?...

a Doubting Thomas?

IF YOU'RE a man who has to be shown, we're right in your corner. Just give Roebling "Blue Center" Steel Wire Rope one try... see for yourself how it saves time and costs you less on the job.

Two out of three wire rope users in the industrial field prefer Roebling rope. Call the nearest Roebling office for a Field Man to suggest the best ropes for your purposes.

ROEBLING

A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE TRENTON 2, N. J.

BETTER PLANTS for today's... and tomorrow's... needs

A report on Trends in...

Materials

By ROBERT S. RICE • Industrial Production Editor, FACTORY

1. MORE SINGLE-STORY PLANTS

The "landslide" to single-story plants is reaching farther and farther into traditional multi-story industries. Savings in materials handling is the No. 1 reason. But better equipment is improving handling operations in cases where multi-story plants are absolutely necessary. *Page B-280.*

2. PRE-PLANNING OF PLANT LAYOUT

More detailed planning of plant layout before design and construction of new buildings is achieving better materials handling—and saving some costly mistakes. *Page B-280.*

3. GREATER SPACIOUSNESS

New plants are more spacious, for layout flexibility and faster materials handling. More free space at costs that are less than handling savings. Wider aisles, more intelligently located, for main traffic. Narrower aisles in storage areas. *Page B-282.*

4. INTEGRATED HANDLING SYSTEMS

Materials handling *systems*, with equipment that really fits the job, are being set up in more plants. The "system concept" makes use of both standardized and specially designed equipment. Equipment manufacturers are improving their engineering to make industrial trucks adaptable to the handling of different types of loads and containers, conveyor units that can be re-used in revised layouts, cranes that can be increased in span—to take a few examples. *Page B-283.*

Handling

5. MATERIALS FLOW

Emphasis on more efficient materials handling by materials flow is broadening out to include many plants that haven't been considered mass-production operations. The idea is to set up separate production lines, under unit supervision, to produce items of major volume. Remaining products, in smaller volume, are processed in separate, regular job-shop facilities. *Page 284.*

6. BETTER RECEIVING AND SHIPPING FACILITIES

They're being planned better in new plants, rather than "tacked on" after process and other services are provided for. The trend is toward engineered height of docks, dock-leveling equipment, adequate space, more mechanical handling of goods, and enclosure of facilities. *Page B-285.*

7. EXTENSION OF MECHANIZATION

Manual jobs that were missed in the first wave of materials handling progress are getting more attention. There's more mechanization of loading and unloading of conveyors. More palletizing. More use of other types of unit loads as industrial trucks become more versatile. Manual work is being engineered out of packaging for shipment. Automation is gaining momentum. *Page B-287.*

ONE OF THE CHIEF REASONS for building a new plant is to take advantage of the improvements it makes possible in materials handling. You can't talk to new-plant builders or designers without being convinced of that fact.

That's why we have included a materials handling and layout section in this BETTER PLANTS issue.

It's almost impossible to get the full cost-cutting benefits of modern materials handling techniques in old plants designed before these techniques were developed.

A case in point: The manufacturer of one of the ultra-modern pieces of equipment described in the following pages told us that 80% of this equipment goes into new plants, only 20% into existing factories.

But, even if you don't see a new plant in your future, there are ideas for you here.

TURN THE PAGE for more on trends ▶

SIGNIFICANT PLANTS of 1952-53

Pittsburgh Plate Glass Company.....page B-288 ▶

Frigidaire Division, GMC.....page B-290 ▶

Atwood Vacuum Machine Company.....page B-296 ▶

QUICK IDEAS for better materials handling.....page B-300 ▶

NEW CATALOGS.....page B-324 ▶

Begins on page B-278

8 Trends in... Materials Handling

1. More Single-Story Plants

THE TREND TOWARD SINGLE-STORY plant buildings is reaching into traditional multi-story industries. Even light manufacturing (such as electrical parts) and flow-process fields (such as chemical products) have joined the single-story parade. Pittsburgh Plate Glass Company's newest paint plant (page B-288) is an example. Another is the Upjohn Company's pharmaceutical plant at Kalamazoo.

In general, the trend toward single-story industrial buildings, which started many years ago, has grown to landslide proportions.

Single-Story Advantages

The reasons for choosing single-story over multiple-story design are pretty much the same today as they have been all along—lower cost handling, more usable space, less in-process handling, greater safety, and construction advantages.

Lower-cost handling · "Horizontal transportation is cheaper than vertical transportation, enough to offset a relative increase in building cost. We build practically nothing but single-story plants now," says W. W. Beardslee, manager of Manufacturing Engineering Services, General Electric Company, Schenectady.

More usable space · Here's how H. W. Maxson, manager, Construction Engineering Division, Lester B. Knight & Associates, Chicago, expresses the point: "Generally speaking, manufacturing operations now housed in a one-story building would require 20% more floor area in a two-story building, and 10% more floor area for each additional story. The extra area is required in multiple-story buildings by additional wall clearances, stair well, elevators, washrooms, and aisles."

Greater safety · A single-story building eliminates some of the hazards of multi-story buildings in the case of fire or other disaster. That's an advantage cited by Fred A. Miller, E. I. DuPont de Nemours & Company.

Construction advantages · L. S. Houk, Westinghouse Electric Corporation, explains the trend to single-story buildings this way: As labor rates increased, consideration of layout and materials handling methods became more critical for production-cost reasons. Right away small column spacings in old multi-story buildings made it difficult to cut handling cost. And 40x40-ft. column spacings raised multi-story building costs to the point where single-story buildings became cheaper to construct.

Single-Story Building No Cure-All

The same authorities, and others, will tell you the single-story building is not a panacea for all production cost problems.

In the first place, plants making a relatively low volume of small assemblies (some electronics equipment, for instance) have a less serious materials handling problem. Also, some processing plants find production equipment so high, at least part of the plant must be two-story, or higher. Then, too, multi-story buildings have their points:

Better equipment than in the past is available today for multi-story handling.

Modern elevators have more capacity, in terms of volume of material per trip and per hour, because they come in bigger sizes and higher speeds. Also, they can be semi- or fully-automatic.

More plants are using conveyors to speed between-floors handling. One plant moves pallet loads between floors quickly by a special conveyor.

Restricted space practically dictates a multi-story building. When that's the case, there are other ways besides better equipment to help minimize handling costs. For instance, the Hallmark Greeting Card Company is building its new Kansas City, Mo., plant on a hill so that all seven floors have street level access.

There's a compromise. F. A. Miller of Dupont sums it up pretty well when he suggests using a combination of single- and multiple-story if your type of operation creates advantages for each.

2. Pre-Planning of Plant Layout

If you don't pre-plan your new plant layout you're bucking a trend.

This actually happened: Superficial planning of a new plant provided for a 12-ft. mezzanine to which materials would be brought and elevated by fork lift trucks. When the plant was ready to operate, it was discovered the truck mast was too high to go through doors. So the doors were torn out and made higher. Then it was discovered an elevator was more practical to get material to the mezzanine!

• **On the other hand,** a soap plant decided on its

PARKER PEN COMPANY USED A 1/48TH-SCALE 3-DIMENSIONAL MODEL TO PLAN LAYOUT OF NEW PLANT.

industrial trucks *before* it began construction, and planned the plant accordingly. So materials handling is as smooth as the product.

• **Another case:** The receiving department of Rockwell Manufacturing Company's new plant at Tupelo, Miss., has been put on the side from which the plant may be expanded in the future. When the addition is built, the receiving dock will be in the center of the plant and material movement distance will be no greater than it is now.

• **Rockwell Manufacturing** says it made a preliminary study of pallets and tote boxes to determine the most economical sizes. *Then* it planned the size of building bays to provide best use of space.

• **E. X. Tuttle,** vice president of Giffels & Vallet & L. Rossetti, architects and engineers, says: "If the production layout is ready, outside engineers can prepare new plant drawings and specifications for bids in two to four months. If it's not ready, allow four to six months to get to the same point."

• **Yeoman Brothers Company** worked with a consultant for two years to make detailed plans for its new Melrose Park, Ill., plant. As a result, material handling costs are low. Heavy parts move the shortest distance in the highest bay. Smaller parts travel a little greater distance mostly through a lower bay. Aisle widths were determined from a study of sizes and volumes of parts and products. Offices are located on the basis of traffic surveys. Washrooms and drinking fountains are near the centers of employee population.

• **Pre-planning enabled Norton Company,** Worcester, Mass., to cut parts travel distances 50% to 90% when it moved its Grinding Machine Division from the old to a new plant.

• **The way General Electric** plans a new plant is typical of good engineering. Here are the steps outlined by P. H. Alspach, manager of Manufacturing Development:

1. Determine plant capacity required for volume and types of products, for present and future.
2. Review product design and manufacturing processes to take advantage of whatever improvements can be incorporated in the new plant. Here's where you go over all the ideas that have been accumulated but not used in the old plant.
3. Develop size and shape of space for each process. Each becomes a "block" in the plan layout.
4. Arrange blocks in a series of "ideal" plant layouts. Consider each layout with regard to practicability and costs. Continue to improve each successive layout until you have the best compromise.
5. Make a three-dimensional model of the final block layout. It serves as a check on the selected layout. It also gives a clear visualization of the layout to others, particularly non-technical people.

Turn the page

COLUMN SPACINGS OF 60x40 FEET PROVIDE LAYOUT FLEXIBILITY IN FAIRFIELD MANUFACTURING'S NEW PLANT.

3. Greater Spaciousness

To give layout flexibility and faster materials handling, new plants are more spacious—wider column spacings, higher ceilings, wider aisles.

COLUMN SPACINGS · The old 20x20-ft. column spacings are going to 30x30 and up. E. Warren Bowden, vice president of Walter Kidde Constructors, Inc., says there are lots of 40x40's now.

International Harvester has standardized on 44x44-ft. bays for manufacturing buildings.

Column spacing in General Electric's new Louisville plant is 40x100 feet.

The extreme is found in the aircraft industry where larger planes have pushed spans to widths that the average plant doesn't need.

R. L. Yowell, president of General Electric's Realty Company, finds that layout engineers would like *no* columns—so they can locate machines, conveyors, and aisles for low-cost materials handling without interference. Also, clear areas would make it easier and less costly to change layouts. But, he adds, you must compromise the ideal for layout with building cost for over-all economy.

D. W. Pennock of Carrier Corporation says it's difficult to use long tractor-trailer trains in less than 20-ft. bays: 40-ft. bays are good, and 60 feet is about the maximum he wants.

Spaciousness Is Economical

There appears to be no question about getting lower handling costs where columns don't interfere with layouts. And the extra building cost is small. Raymond Epstein of A. Epstein & Sons, Engineers, Chicago, says a 20x80-ft. steel truss bay costs only a nickel or so more per square foot of building than a 20x40-ft. steel truss bay.

General Electric's Mr. Yowell says it's cheaper to add 10% to a building's height than to add the equivalent in floor area.

CEILING HEIGHTS · A. H. Gillmore of the Gillmore-Olson Company thinks the average ceiling height of new plants is close to 20 feet, where it was only 13 feet not long ago.

The first building (of five) of General Electric Company's new appliance plant at Louisville has a clear height of 27 feet throughout. But the engineers decided that wasn't enough, so the other buildings will have 30 feet minimum under the roof truss.

Fork lift trucks are stacking materials higher. The truck manufacturers can provide a truck for any height you can use. Where materials won't stand crushing, pallet racks now provide support.

Conveyors are going overhead, both to transport materials and to provide storage of materials in process. General Electric is providing the 30-ft. minimum height at Louisville so it can run one conveyor under another and still have headroom.

D. E. Davidson, Link-Belt vice president, says savings are the big reason why many plants go to overhead conveyor systems for material banks and movement. The calculated savings come from elimination of the need for additional floor area, plus costs of servicing that area.

The "use of air rights" idea has moved cranes up, too, as engineers have provided floor-load capacities and safe stacking methods.

The stacking crane, with forks or other devices to handle the load, is a relatively new way to utilize vertical space.

FLOOR LOAD CAPACITY · A Navy officer who gets around industry a lot thinks floor loads have gone up nearly 50% within the past 10 years.

H. J. Heinz Company used to be satisfied that 750 pounds per square foot was a good ground-floor load-limit. Now it needs up to 1000.

The new Cutler-Hammer plant has a floor load capacity of 3000 pounds for steel storage.

AISLES · R. W. Mallick of Westinghouse says there's more designing of aisle sizes and locations according to traffic patterns—based on studies of load sizes and material flow. The general pattern is main aisles along the sides, cross aisles through the center production area. Some plants are using one-way aisles to permit fast movement of materials.

Besides aisle widths that are adequate for fast, safe movement of materials, H. H. Hall of Alcoa suggests aisles must provide access for emergency equipment, such as fire trucks.

Speaking of wide aisles, those of Cadillac's Cleveland Tank Plant are wide enough for highway trailers to deliver loads directly to the point of use, with room for other trucks to pass.

On the other hand, there's interest in saving aisle space, too.

Consultant I. M. Footlik finds a strong trend toward use of the outrigger-type fork lift truck to save aisle space in storage operations. These trucks can operate comfortably in 6-ft. aisles, can save approximately 25% of over-all storage space.

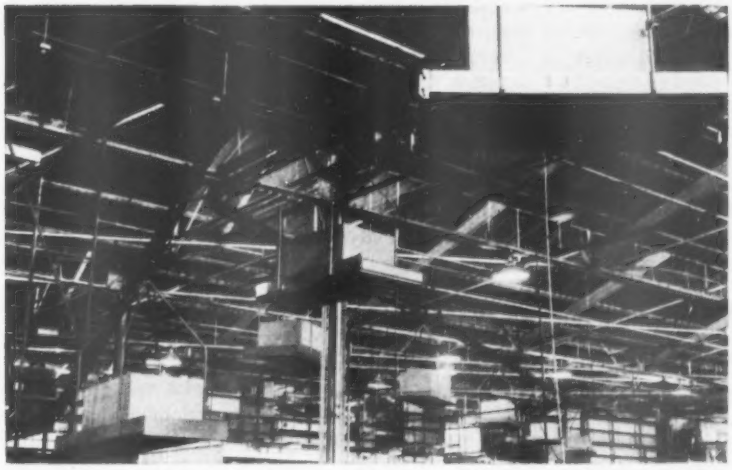
SPACE ALLOTMENTS · Production machines are being moved closer together to shorten material moves. So, relatively, storage space is increasing. That's the observation of:

- R. F. Webber, International Harvester: "More use of conveyors between machines to save space."
- R. W. Mallick, Westinghouse: "All storage space considered, it's about twice as much as space for processing. An operator can be efficient in just so much space, beyond which he has to walk further for tools, materials, etc."

More outdoor storage is hardly a trend, but it could be if present experiments work out. Several companies are trying various covers and protective coatings on products, dies, and other equipment that normally isn't stored outside.

S. T. Gemar, consultant, says cost of buildings and availability of pneumatic-tired trucks have combined to make outdoor storage attractive.

4. Integrated Handling Systems



DOUGLAS AIRCRAFT INSTALLED overhead conveyor to improve material flow through ten departments, saved $10,000 a year. Carriers serve eight stations.

OPERATOR PLACES TAB to trip a limit switch to stop carrier at its destination.

Better new plants created materials handling systems with equipment that really fits the job.

The trend appears to be a combination of two objectives that are diametrically opposed: (1) use of standard equipment, and (2) use of special equipment designed to perform a specific job.

Speaking as a user of materials handling equipment, R. F. Weber of International Harvester expresses the general approach to the question of standard or special equipment: "We first try to utilize standard equipment for a given application. But we emphasize the right type, capacity, and amount of equipment for each job. Therefore, we'll recommend special equipment if that's practical and economical for a particular handling job."

From the manufacturers' point of view, the best approach is maximum standardization of equipment components from which a large portion of each tailor-made application can be assembled. R. I. Hicks, president of Lamson Corporation, agrees that standard equipment is a fine idea, and that there are practical applications, but he points to many single-case exceptions, especially in the conveyor field.

Turn the page

• "We're all for standard equipment," says O. S. Carliss of Yale & Towne Manufacturing Company, "but we can't deny there's a logical need for specially designed equipment. Our engineering efforts are directed toward the refinement of basic 'building blocks'—components—that can be put together in a variety of industrial truck models."

• E. W. McCaul, Jervis B. Webb Company, finds that more attention is being given to understanding a process to integrate materials handling methods with the process. He suggests that there's often an opportunity to change processes or operations to improve the handling that is necessary to the production job.

In describing the manufacture of electric ranges in General Electric's new Louisville plant, W. L. Goodfleisch says: "We have provided mechanical handling and controlled production cycles wherever possible, and built in safeguards to assimilate technological improvements."

That means a pre-planned, integrated system of materials handling, with a building provided to house the plan.

That calls for built-in flexibility—the creation of a materials handling system that is adaptable to reasonable changes.

Integration may go beyond part or all of a single plant. One company is considering a special container and fork truck system to move an intermediate chemical from one plant to another by rail. Containers would stack in the receiving plant. This method integrates handling in both plants. And it provides more flexibility than a fixed conveyor-silo system.

What this adds up to is a trend toward complete plantwide integrated materials handling systems, instead of plants full of mechanized handling methods applied to individual operations.

What Integration Requires

Integration of handling requires:

• Utilization of standard equipment to provide flexibility in the system.

• Equipment that's designed to do a specific job, a segment of the plant handling system.

• **Regarding industrial trucks,** Yale & Towne's vice president E. F. Twyman says: "The trend in our industry is emphasis on providing truck and attachments to perform a specific mechanical handling operation efficiently. The main problem is no longer simply mechanized *versus* manual handling. For this reason we must constantly deal with the need for improved engineering of power transmission, safety, and facility of operation."

• **Intra-plant radio communication** coordinates the movement of mobile handling equipment—locomotives, cranes, and trucks.

• **Power and free conveyors,** and switching conveyors of all types, provide a flexibility in material movement that you can't get in a single-track.

• **Portable conveyors** can be set up quickly to bridge temporary gaps in material flow.

• **Overhead cranes switch from bay to bay** to provide continuous material flow. Also, they're faster, more maneuverable, and safer.

A couple of effects of this concept:

• "There are no fixed rules for equipment application, no such thing as too long a trip for a fork truck, or too short a trip for a conveyor. Selection depends upon analysis and development of an integrated materials handling system."— *S. T. Gemar, materials handling consultant.*

• "Consolidation and integration of operations in our new plant improved materials handling to the extent of $100,000 a year."—*H. Oldenburg, plant manager, The Mennen Co., Morristown, N. J.*

5. More Emphasis on Material Flow

Generally, the idea of material flow has been associated with the high-volume, or mass production, industries. But the trend now toward improving material flow is not restricted to the big producers of few product models. Job shops, too, are doing something about it.

There's more than one approach toward the ideal of moving materials and products non-stop from receiving car or truck. Here are some of them:

• **At Westinghouse,** H. S. Houk says: "We made quite a study of material flow when we set up manufacturing facilities in our Mansfield (Ohio) appliance plant. As a result, our concept is to keep material moving through the processes as fast as possible, with a minimum amount of material holding between processes. No storage is best. Laying down material requires an extra move, and may damage it. The Mansfield plant was set up to manufacture some items in half a working day, from start to finish.

• **At GM's Fisher Body Division,** the press rooms are divided into lines. One set of lines stamps and forms automobile doors; other lines form various body panels. When there's a model change, some presses are moved to reform the lines. One obvious advantage is high production. But separate press lines for individual products permit continuous movement of material—from stock to product—with no intermediate storage. Fisher uses automatic devices to handle material into and out of some presses.

There's no space provided for material pile-up if a press breaks down. First, of course, there's plenty of emphasis on preventive maintenance. But if a machine breakdown stops a line, one or more duplicate lines maintain part of the production schedule.

A simplified example: "If total production requirement is 200 parts per hour, two duplicate lines each produce 100 parts per hour.

The trend toward greater flow is part of a trend toward cutting in-process inventories. E. W. McCaul of Jervis B. Webb Company, reports at least one case in which the only benefit of a conveyor installation was in-process inventory reduction through practically automatic production control. But that advantage was enough to pay for the installation within a short time.

Works in Job Shops, Too

• **A job-shop example** described by M. L. Levy of GE is based on this principle: "The fewer the groups involved in manufacturing a product, the greater the manufacturing efficiency."

The problem was one of cutting production costs in a job-shop operation of a GE division. There were several functional departments involved in processing all products. The result of the project was a complete relayout into 22 separate production lines supervised by eight foremen. Left over was a small job shop with functional departments run by one foreman.

Additional equipment—machine tools, conveyors, industrial trucks—was required for the same total production. But materials handling savings and faster turnover of materials justified the additional investment.

• **For another job-shop example,** see the description of the new Atwood Vacuum Machine Company plant, page B-296.

Flexible Production Lines

More flexible layouts are helping cut handling costs in job shops where it isn't desirable to set up a permanent production line.

• **The Aluminum Cooking Utensil Company** has some machines on wheels, so it can move them quickly into positions that provide better material flow for small lots.

• **Du Pont** has grinding mills placed so they can be moved out of an explosive vapor area for repair by welding without stopping operations.

• **You can take advantage of process improvements** to improve material flow, suggests D. W. Pennock of Carrier. He cites dynamic balancing machines that keep pace with production lines.

• **Maybe your production-line problem is different machine speeds.** R. F. Weber of International Harvester says some plants have actually saved money by slowing down a machine to get it into synchronization with others in a line.

Also, he suggests adaptation of the mass production transfer machines—which, incidentally, are another means of cutting handling out of material flow where volume is high. The transfer principle can be adapted to lower cost machines, placed close together so that materials handling can be reduced by shorter moves, and semi- or full-automatic movement from one machine to another.

• **Another idea being used is a bank of spare machines** from which a substitute can be drawn to replace one that needs repair. The advantage of this plan can be realized, of course, only if machines can be moved faster and at less over-all expense than repair of the machine in place.

• **Paul Vogt of GE points out another trend** that's really a part of the big trend toward improving material flow. It's the transfer of packaging into the production line, which eliminates another pick up and set down in the flow of products. Better packaging methods and equipment are helping achieve this objective. For instance, carton-making machines help simplify the integration of carton supply and production so that they can be combined without creating critical timing and handling problems.

6. Better Receiving and Shipping Facilities

An automotive executive told us this story: The company needed more output, so one of its assembly plants was put on a two-shift schedule. Within a week the plant was in trouble—short of the production goal. No assembly operation was to blame. Receiving just couldn't handle the input, even with the receiving department working three shifts. Actually, it had been working two shifts before to handle one-shift production.

No Longer Appendages

Which illustrates the point: Receiving and shipping used to be "appendages," tacked on after all other processes and services had been provided for in new-plant plans.

But the better new plants prove that there's a definite trend toward improved receiving and shipping facilities. It's coming to be recognized that they are important steps in the flow of materials and products.

Truck transportation growing: "We recommend to our clients that they double the space they think is necessary for truck loading and unloading if they estimate their needs are generally small."—*A. H. Gillmore, The Gillmore-Olson Company.*

"More truck space, less rail space."—*J. R. Fraser, The H. K. Ferguson Company, Cleveland.*

Receiving and shipping going under cover: "Nearly all new plants have docks under cover."—*General Motors Corporation.*

"More docks are being enclosed, even in the South. One reason is that trailers are frequently stored within them to wait for loading or for a tractor and driver."—*G. W. Cumbus, J. E. Sirrine Company.*

But there are many economical compromises on totally enclosed docks, too. For instance:

Turn the page

• **John A. Roebling's Sons,** in its new Chicago warehouse, has a totally enclosed rail and truck dock where large shipments are handled. There's also a one-truck, small-lot shipping dock, with only the loading platform enclosed. With the door to the outside closed, a shipment is transferred from shipping department to loading dock. Then the door between shipping department and dock is closed, and the outside door is opened. The truck backs to the dock where it's quickly loaded.

◄ **The new Mennen plant at Morristown, N. J.,** has a canvas cover on a telescopic frame to span the distance between railroad boxcar and building. Relatively inexpensive, it protects workers while they're loading or unloading a car.

Where docks are enclosed, doors are important. Several people we talked with cited the advantage of easily operated doors.

Truck dock approaches getting bigger:

One company put its truck receiving dock close to the property boundary line. That was just a few years ago, but already trouble has developed because there's barely enough room for an expert driver to manipulate today's tractor-trailers.

So the trend includes longer approaches and more space to maneuver the larger rigs. Also, some plants report trouble with sloping ramps of high pitch. If they're enclosed or heated, there's no ice problem, but the trucks are more difficult to load and unload.

• **At least one new plant**—Frigidaire in Dayton, (page B-290) has a "drive through" truck dock. Open-top trucks drive in one door, pull alongside the dock for crane unloading, and go straight out another door. This eliminates maneuvering.

Adjustable docks are going strong:

Those are the words of T. J. Hodgson of The H. K. Ferguson Company. And everyone seconds the motion. There's such a spread in highway truck bed heights, and such a tremendous growth in industrial truck loading and unloading, that adjustable dock boards or truck levelers are practically a must.

Of course, where a plant has little variation in truck bed heights (using its own trucks, for instance), bridge plates are still satisfactory—as they are for boxcars at matching-level docks.

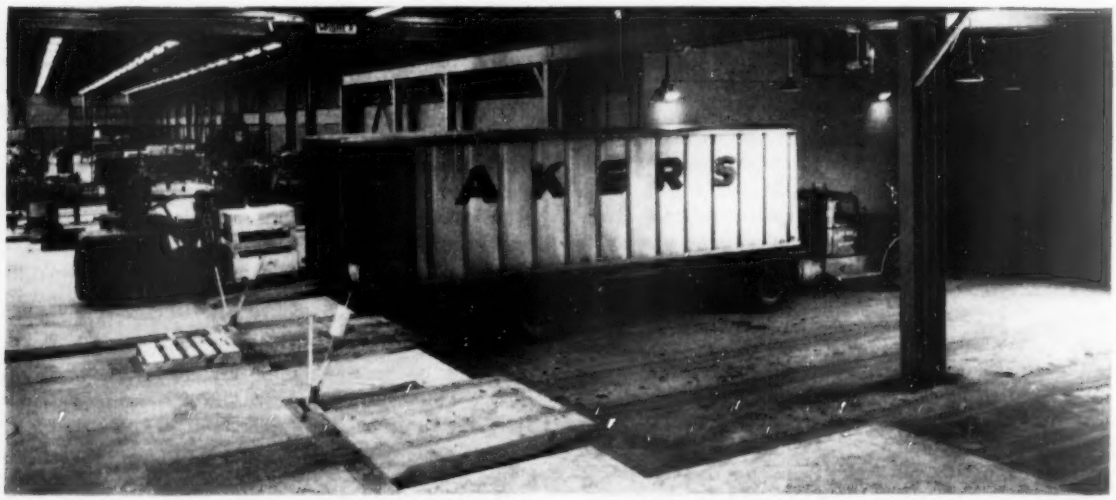
And, where docks don't exist, portable ramps (especially the light weights) are finding more use to aid mechanized handling.

Also, G. E. Demorest, Materials Management Center, Wayne University, says he has been in some plants that feel docks are all wrong. They believe it's practical to drive a truck into the plant and unload or load with high-lift truck or crane. That practice eliminates a material movement.

There still are some problems that make mechanization tough—such as placing a crated refrigerator horizontally on top of vertically-loaded refrigerators in a boxcar. But at least one company with that problem has been working on it—to mechanize the handling.

The use of industrial trucks for loading and unloading of boxcars and over-the-road trucks continues to grow.

• **H. H. Hall,** Aluminum Company of America reports more open-top trucks in use. They make it easier to handle long and heavy loads by crane.



BETTER SHIPPING AND RECEIVING facilities are seen in Saco-Lowell Shops' new Biddeford, Me., plant. Truck dock is enclosed. Adjustable dock boards permit safe handling with fork trucks. Overhead crane services open-top trucks.

7. Extension of Mechanization

Mechanization of materials handling has just begun. The combination of manufacturers' equipment and users' ingenuity has eliminated much manual handling in industry. But there's still a lot left—in machine and conveyor loading and unloading, crane following, palletizing, and packaging—to name a few examples. Today there's growing emphasis on mechanization of the "left-overs."

Reasons for Greater Mechanization

1. Continuous climb in labor rates.
2. Need for better production control.
3. Need for better inventory control.
4. Pressure to reduce damage to materials.
5. Pressure to improve working conditions.

Conveyor buyers, for instance, often start out wanting an elaborate automatic system. Usually they give ground from that point on the basis of cost, comments E. W. McCaul of Jervis B. Webb. But that's a healthy condition. The buyer is bound to salvage some of his ideas—and it puts pressure on the manufacturers to develop ways to give the customer a little more of what he wants at a lower cost. Anyway, the use of automatic devices to load and unload conveyors, including automatic dispatching to selected stations, is growing.

Palletizing continues to progress as a way to get rid of manual handling "left-overs." There are automatic palletizers and de-palletizers for cans. Vacuum cups lift the cans out or off the pallet, a layer at a time. This equipment may find adaptation to others containers or material forms.

Such developments tie in with the slowly increasing practice of shipping products on pallets that require pallets for unit-load handling. It eliminates manual handling at the receiving end (and perhaps at the shipping end, too). The main obstacles are: (1) cost of adequate pallets, including shipping costs; and (2) the need for comparable handling in the plants of supplier and customer.

• **Westinghouse Electric** is one of several companies attempting to get more materials shipped into its plants on pallets.

Unit loads—even without pallets—are increasingly possible by the use of special attachments for fork trucks. Attachments are improving in versatility and quality, as well as number.

• **Consultant S. T. Gemar** finds growing utilization of the hydraulically operated fork truck clamps to handle unit loads without pallets.

Packaging for shipment is a big field for mechanization. There's interest and progress in it.

• **Paul Vogt of General Electric** says many plants are interested in automatic packaging but there's very little in his type of industry. He says two things are needed: machines to do the packaging; and a one-piece wrap-around pack that a machine can manipulate. GE is working on that problem.

ELIMINATION OF MANUAL HANDLING is a cost-cutting must. Geerpres Wringer uses portable conveyor to unload cars.

Closing is a cinch with present automatic equipment—gluers and sealers, and stitchers.

The inspection problem has, in the past, discouraged development of automatic packaging. It's general practice to have final inspectors place the products into their packages (or packagers perform final inspection). However, statistical quality control techniques and mechanized inspection offer **some** hope in that direction.

Progress in Automation

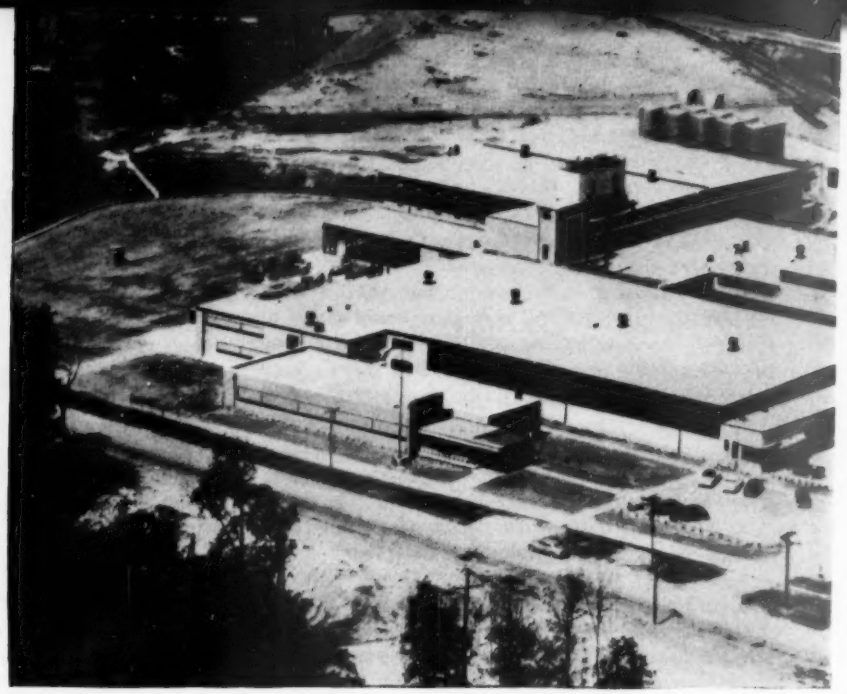
Automation is the big development that makes further mechanization an outstanding trend. Born in the automotive industry, in concept and terminology, it still pretty much resides there. But there's development going on in other industries.

Actually, automation isn't new. For instance, cigarette making, beverage bottling, and many other automatic processes involving progressive operations are "old hat." But generally, cigarettes and bottled beverages haven't changed in "design" in many years. What's really important about automotive and now other developments in automation is application of the concept to the manufacture of products subject to design change.

For instance, there are frequent major changes in auto bodies, yet Fisher Body Division of General Motors has applied automation devices to many of its press operations.

Point is: Automation is moving toward being used in production of smaller volumes of product. Not far, but it's moving. Since publication of an article in December 1952, describing Ford's automated engine plant in Cleveland, FACTORY's editors have received numerous letters from companies smaller than Ford, with much smaller production runs. These companies want to know how they can get started into automation. Their interest indicates the line of progress they are planning.

BETTER PLANTS for today's... and tomorrow's... needs



BUILT-IN GRAVITY FLOW IN SINGLE-STORY PAINT PLANT . . .
Split-level plant, built by Pittsburgh Plate Glass in Georgia, is a series of single-story buildings on two different ground levels. It uses gravity flow to cut handling costs, provides

Process Industry Follows

MANY "PROCESS" INDUSTRIES have been pushing their new plants down closer to the ground, and spreading them out more. They're following the trend to single-story plant buildings. But the switch is slower than in "parts manufacturing" industries because it's a real trick to design the process layout to retain the advantages of gravity flow in a one-floor structure.

For instance, multiple-story buildings have been considered essential for paint manufacturing. But Pittsburgh Plate Glass Company finds economies in lower buildings for its paint products, and ways to design single-story manufacturing.

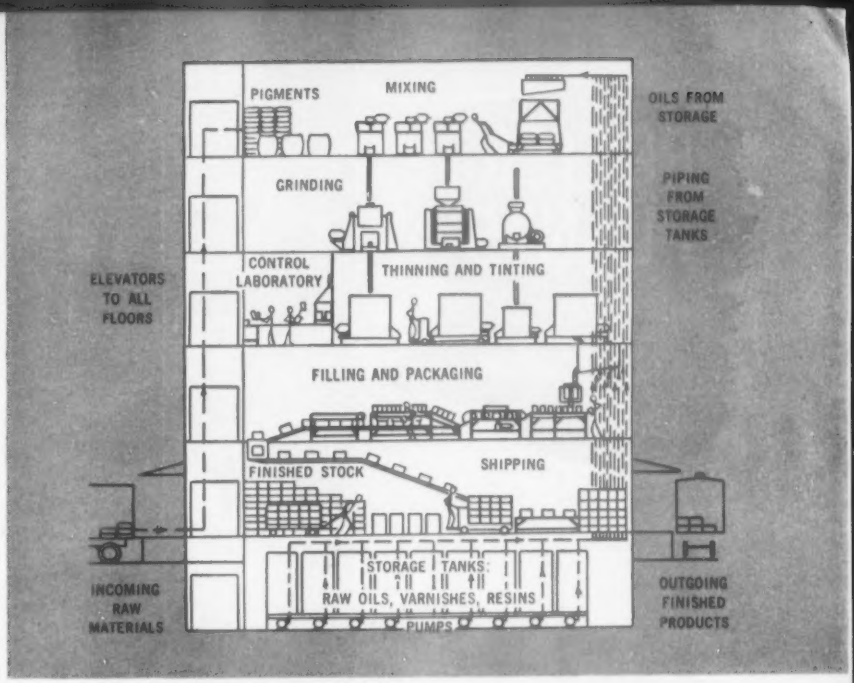
PPG's older paint plants were around five stories high (see diagram). Two years ago it completed a new two-story plant at Torrance, Calif. Its latest is a single-story plant at East Point, Ga.—actually a series of connected single-story buildings on two different ground levels. The arrangement of the buildings more or less follows the terrain. The process layout permits as much utilization of gravity flow as in the older plants. Also, a mezzanine floor (in the lower level) provides a part-way-down level for grinding and straining. Structural frames under the deck support ball and pebble mills for grinding.

P. E. Knudsen, the designer, admits a single-story building, properly designed for paint manufacturing, generally costs more per square foot

A SIGNIFICANT PLANT OF 1952-53

NAME: Pittsburgh Plate Glass Co. Paint & Brush Div.
LOCATION: East Point, Ga.
PRODUCTS: Paints, varnishes, and other finishes
EMPLOYEES: 100 (at capacity)
DESIGNER: P. E. Knudsen, Architect, Paint Div.
ARCHITECT: Robert & Co. Associates, Atlanta
GENERAL CONTRACTOR: Ira H. Hardin, Atlanta

unusual flexibility for future rearrangements and expansion.



. . . REPLACES TRADITIONAL MULTI-STORY METHOD
Sketch shows time-honored way to make paint. Materials are stored in basement and elevated to top floor. They then flow down through manufacturing process.

Single-Story Trend

than a multiple-story plant on the same site. But this cost, he says, is offset by two big advantages:

- Materials handling costs less in the single-story plant.
- Single-story space is more flexible for expansion and rearrangement of operations.

PLANNING · The process layout of such a plant as this one must be designed in complete detail before planning the buildings. Relief maps of the 14-acre site were necessary. When design and arrangement of buildings were completed, a scale model helped explain the plant proposal to top management.

MATERIALS HANDLING · Rail and truck docks at two levels facilitate receiving and shipping.

Raw materials come in liquid and dry form. Most of the liquids are transferred from tank cars into storage tanks. From there they are pumped to the processes. Dry materials and liquids in containers are handled by fork lift trucks, on pallets or in drums.

Paint-making is largely a batch process. Liquids are pumped from storage tanks into portable mixing tanks, which are placed on scales to control the mix. Dry pigments, in bags on pallets, are added to the mix when required. A 10,000-lb. platform truck takes the mixing tanks to a grinding mill for paste.

Gravity carries the paint through grinding, blending, and tinting. Then a 20,000-lb. hydraulic ram elevator lifts truck and the batch container up into the mezzanine. The paint flows through a strainer into hoppers above the filling machines on the main floor. Automatically filled, cans of paint move to shipping on conveyors.

Some paint is made in relatively large volume, continuously. It moves from operation to operation through pipelines, usually by controlled gravity, sometimes pumped.

OTHER PLANT FEATURES · The factory buildings are of reinforced concrete and structural steel construction. Exterior walls are concrete block, brick faced. The office section is brick.

Offices and laboratories are air conditioned. The 20-ft. ceilings and insulated roof throughout the factory improve air circulation and help hold temperature down in production and storage areas.

Upper portions of office sidewall areas are filled with light-diffusing glass blocks. Beneath them are 15-in. steel-sash vision strips. Heat-absorbing glass is used in most of the factory areas; but where paint is thinned or tinted, clear glass provides pure daylight.

Interior artificial lighting is provided by continuous rows of ceiling-mounted fluorescents in offices. Factory is lighted by vapor-proof or explosion-proof Mazda lamps.

BETTER PLANTS for today's... and tomorrow's... needs

PRODUCTION EFFICIENCY AND FLEXIBILITY IS BUILT INTO FRIGIDAIRE'S NEWEST

Built for

A SIGNIFICANT PLANT OF 1952-53

NAME: Frigidaire Div., General Motors Corp.
LOCATION: Dayton

PRODUCT: Ranges, refrigerators, freezers
EMPLOYEES: 6000

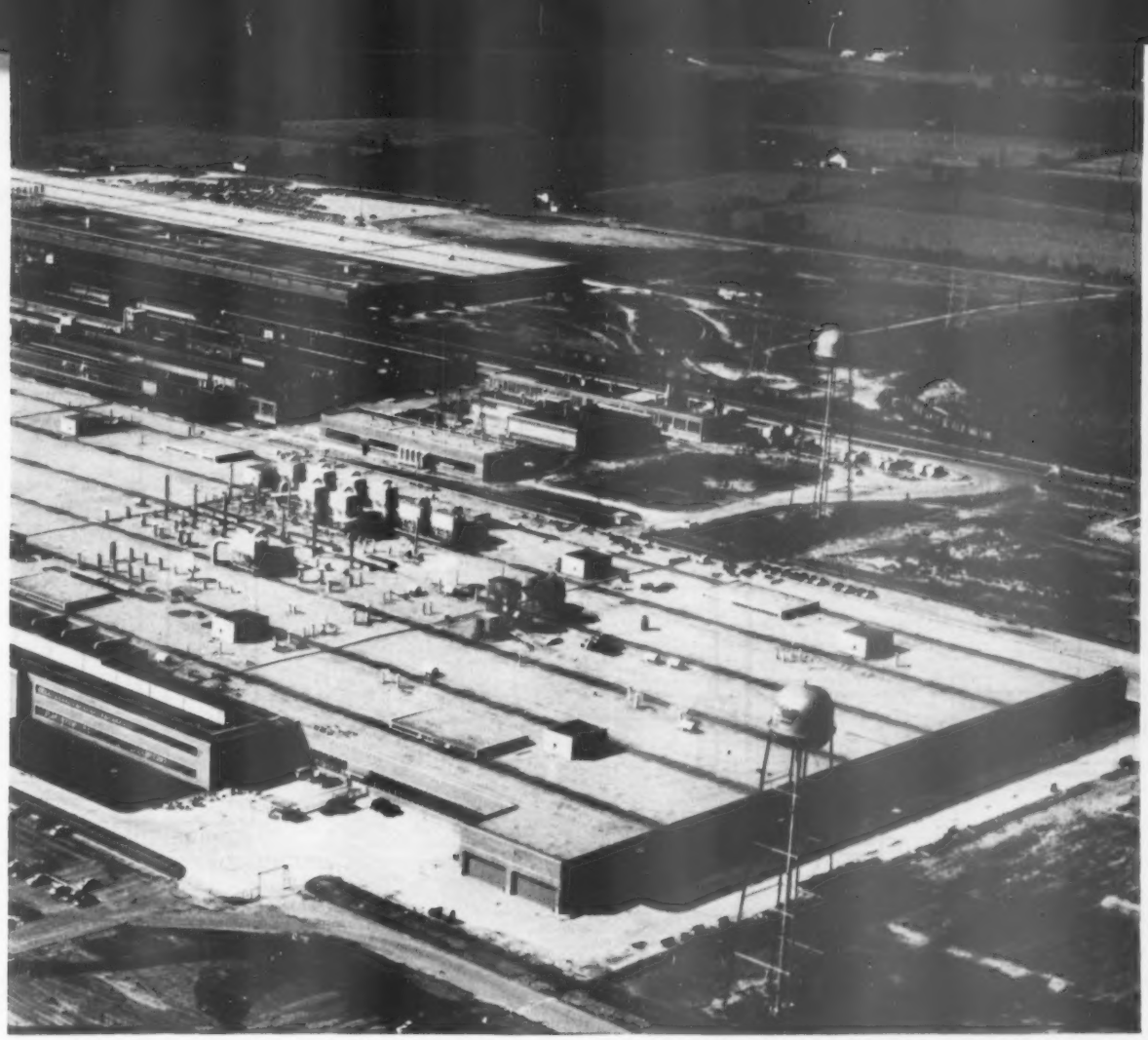
ARCHITECT: Schenck & Williams, Dayton
ENGINEER: Frigidaire Div., Mfg. Processing Dept. and Utilities & Construction Dept.
GENERAL CONTRACTOR: Chas. H. Shook, Inc., Dayton

PRE-PLANNED for efficient materials handling and flexibility of layout best describes Frigidaire Division's new 1-million-sq.ft. appliance plant at Dayton, Ohio.

Frigidaire's engineers analyzed the shortcomings of their existing plants, and planned the new one to lick them. By so doing, they hoped to turn yesterday's handicaps into today's forethought. Here are some examples:

• **New layout is based on use of conveyors.** Not a new thought to Frigidaire, to be sure. But experience in its other plants had shown a tendency to understimate the need for plenty of clear height.

At one older plant, low ceilings had kept overhead conveyors close to the beams, with little space for plant services. Result was phenomenal cost for every important re-layout. Utility and service lines had to be moved for every production



PLANT. SERVICE DEPARTMENTS ARE OUT OF THE WAY, SOME EXTENDING THROUGH THE ROOF.

Good Production Flexibility

change. Downtime, too, was more frequent and extensive than it should have been.

Lesson learned: Provide plenty of overhead space when the plant is built. Assign separate layers of space to plant engineering and production. Let neither encroach on the other's space. Plan for double-decked conveyors in advance.

• **Width of building was determined by floor conveyors for assembly.** It's basically wrong, Frigidaire engineers think, to squeeze a production layout into a preconceived plant design.

So, following that reasoning, the engineers first created a production layout. It included lots of floor conveyors, adequate space between them, and plenty of service aisles. They allowed 100-ft. bands of floor space on each side of the assembly layout for services and small departments. Then the plant building was designed to this basic layout. Result was a plant fitted to a versatile production layout.

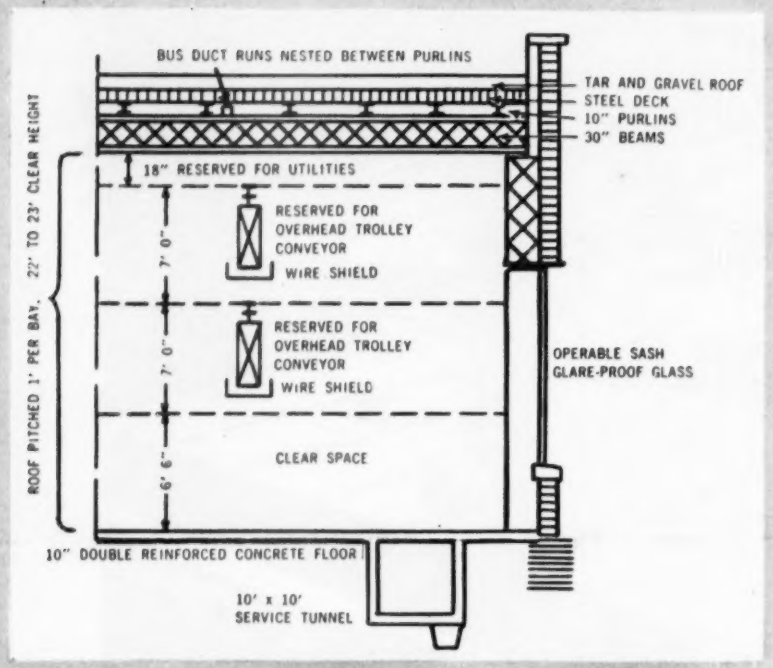
• **Plant size was determined by production goal, plus provision for expansion.** Essentially, plant size was controlled by the number of units of each product Frigidaire wanted to make in it over a given period of time.

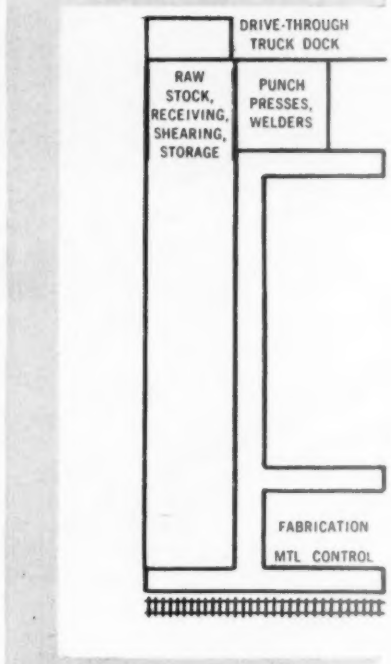
Engineers then worked backwards, converting machine and manpower requirements into floor space needs. The result was gross area.

They then considered the best shape for the layout and suggested a width. By dividing width into gross area, they got the length.

• **Perimeter space was given to miscellaneous departments** to keep production areas clear of miscellaneous, special-purpose, and service departments. That way, future changes in production layout won't mess up nearby departments and create secondary moves.

Turn the page





PLANNED MATERIALS HANDLING and utilities distribution set clear height to the beam at 22 feet. Plant has few conveyors at two levels, but there's space for them.

• **Stock conveyors were placed overhead for floating inventory.** This, Frigidaire engineers figure, is expensive. But it's cheaper than floor space in some cases. Their object, therefore, was to find a happy compromise.

They unit-load and floor-bank some parts, and put others up in the air on conveyors.

The ratio is roughly 30% truck handling and floor banking to 70% conveyor handling and storage, at this time.

• **Quick unloading of incoming materials is essential.** At another Division plant, trucks of incoming raw steel were often lined up for half a mile on Monday mornings waiting to unload.

That won't happen at this plant. With a drive-through truck dock for raw steel receiving, equipped with two 10-ton overhead cranes, a big flatbed trailer can be unloaded in less than 10 minutes.

Beauty of this dock is that trucks drive in one side and out the other. And two can be unloaded at a time.

Part of the scheme, of course, is to provide specialized docks around the plant where different kinds of incoming supplies can be unloaded close to their points of use.

• **Ramps and tunnels help a lot.** In facing the problem of getting finished goods to the central warehouse ¼ mile away, engineers decided on ramps and a tunnel.

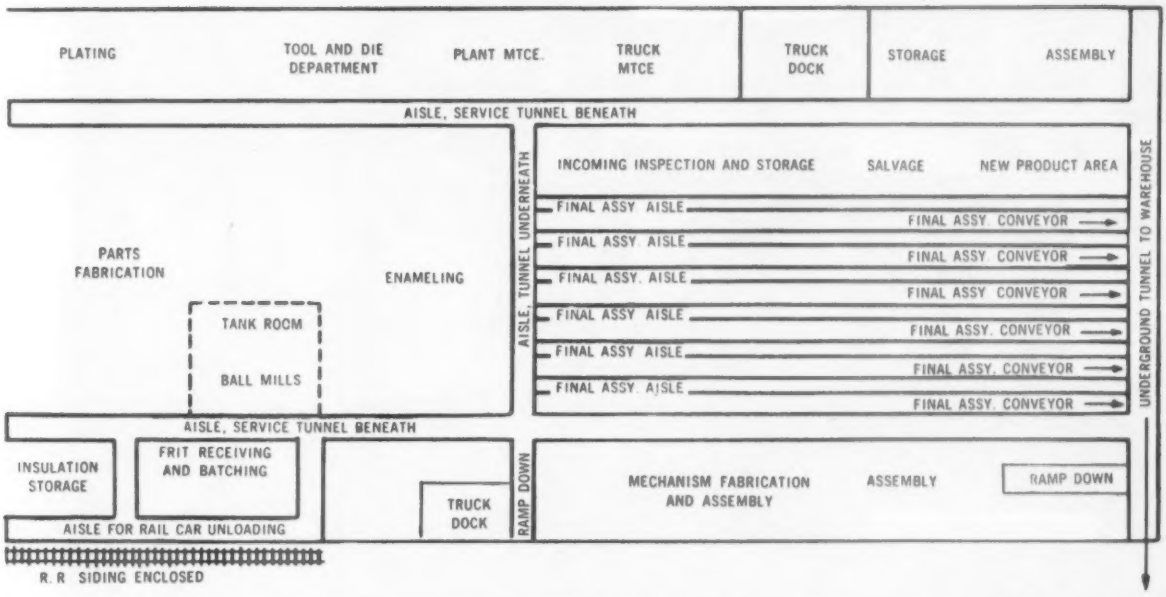
Although a bridge was considered, it was a potential accident hazard and would require expensive maintenance. So a heavy concrete tunnel was designed to do the job.

Despite the fact that it runs far below grade, it is fed by ramps with no more than a 12% grade. Furthermore, by handling products through a tunnel, a highly automatic conveyor system could be used.

• **Production offices and restrooms get in the way—if you let them.** Frigidaire didn't. It elevated them above the production floor.

Offices are anchored to the building columns and to separate columns, and spaced at irregular intervals throughout the plant. The amount of supervision needed in each area governed their spacing. Windowed offices give supervisors good views of their areas.

Restrooms are spaced more regularly, so no employee has to walk more than 250 feet to get to one. To provide ventilation, the engineers pushed the restrooms halfway through the roof and installed operable sash. The result is elevated restrooms equipped for natural ventilation and some natural light. The production floor is clear below the restrooms.



LAYOUT EMPHASIZES central production space to eliminate interference and to make layout changes easier. Wide main aisles around production area feed smaller cross aisles (not shown). Offices and restrooms are elevated above floor level.

Nine Ways To Flexibility

When Frigidaire's engineers got through, they had a new plant with nine important features that will insure high-efficiency operations for many model changes to come. Here they are:

1. Conveyor handling is improved because of a 22-ft. clear space between floor and beams. Air rights are reserved for headroom, conveyors, and utilities.

Utilities are in the first 18 inches under the beams. The next 14 feet down is allowed for double-decked trolley conveyors and their guards. The remaining 6½ feet is for headroom. This relatively low headroom actually exists only where conveyors are double-decked—a small fraction of total space.

2. Truck handling is improved. Main aisles are broad and long, allow uninterrupted travel for 1600 feet. Their 12-ft. width allows trucks and trailer trains plenty of room.

Departmental aisles, 8 feet wide, adjoin production areas. They keep a lot of departmental traffic off the main aisles.

Bigger space permits use of bigger containers, 60x37x40 inches, for parts handling.

The high ceiling permits fork trucks to stack pallets as high as desired without worry about sprinkler clearance.

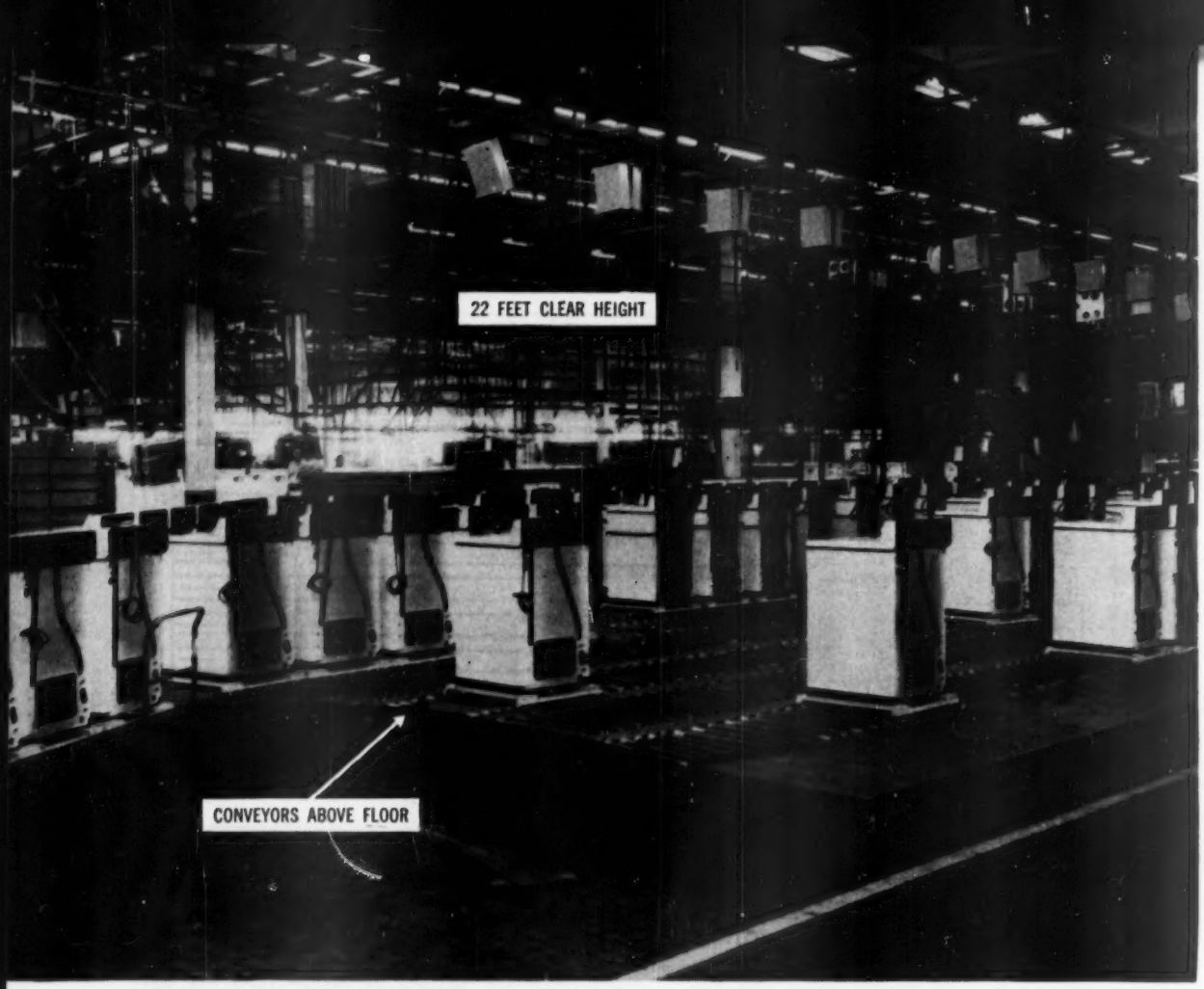
3. Production areas are concentrated in the 1600 x400-ft. center section of the plant, flanked on each side by one of the main aisles.

Several benefits are realized from this layout scheme. Straight-line flow is a reality, from receiving to shipping. The amount of overhead conveyor needed is kept to a minimum. Subassembly areas can be spotted across the aisle from the main assembly sections they feed. And nothing really interferes with layout changes.

4. Service areas are out of the way. Because they are placed inside a 100-ft. strip, on either side of the production section, their locations can be governed by the production areas they serve. Shops, toilets, storage tanks, and the like, are in these perimeter sections.

5. Service lines are underground in 10x10-ft. tunnels, for the most part. Steam, condensate, water, and de-ionized water lines were put in the tunnels to keep them from slowing down layout changes. And it helps to keep the cost of such moves low, too.

Briefly, service lines are laid out like this: The mains are in two large tunnels that run directly under the two long production aisles. Then, as required, the service mains are tapped and risers come up through the floor at the columns. Laterals are taken off the risers as needed. The result is a



OVERHEAD AND FLOOR CONVEYORS combine to keep materials and products moving. Overhead conveyors hold reserve of parts, dip down to supply floor-level assembly conveyors. Floor conveyors are installed on top of the floor to eliminate pits and make it easier to rearrange layout. Also, the height is convenient for assembly operations.

ceiling that is relatively free of piping and wiring.

Oxygen and acetylene lines are not in the tunnels, but overhead because of the explosion hazard.

The steam main comes up out of the tunnel at the north end, goes to the ceiling, across the plant, and down into the other tunnel. Reason: Frigidaire didn't want such services underground at that end because big presses are located there. Furthermore, it didn't want a tunnel in the way of future press area expansion.

6. Receiving facilities are generous. And they're placed where the materials enter the production flow. Raw steel stock, for example, comes into a drive-through truck dock at the northeast corner of the plant. From there it enters the steel preparation area adjacent.

Insulation for ranges, on the other hand, comes in by carload on the other side of the plant. It's unloaded reasonably close to its point of use.

Proper location of receiving facilities and parts banks, Frigidaire engineers think, can do much to cut handling costs. One costly handling can be saved, for instance, when a pallet load can be trucked straight from the carriers to a production parts bank along the fabrication or assembly lines. This plant was designed to make this saving.

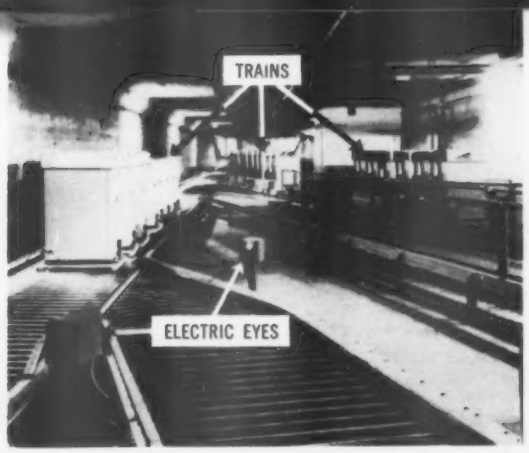
7. Crating and shipping are centralized in a warehouse building a quarter of a mile away. This new plant, therefore, ties in with the production flow from other manufacturing buildings on the same site.

Integration was solved by developing an underground conveyor tunnel that carries the large appliances under a highway, another plant, a railroad main line, and up into the warehouse.

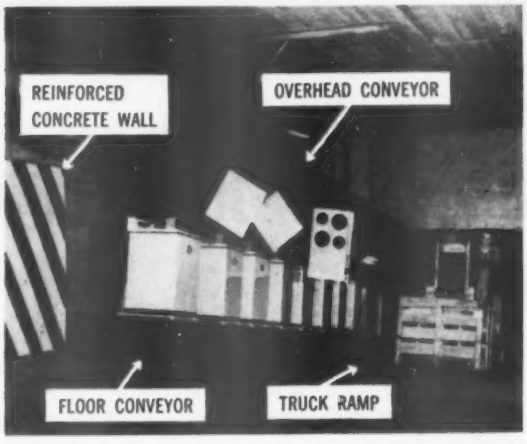
An interlocked switching system on the powered roller conveyor permits it to handle the output of six (eventually eight) final assembly conveyors. Electric eyes control the switching operation and assemble groups of appliances into short trains before releasing them to the tunnel conveyor.

8. Allowance was made for production increases in the original layout. About 10% more floor space is available for new product manufacture. The output of present production lines can also be increased.

9. Plenty of land was planned for growth. To the north there is an area wider than the plant and



ELECTRIC EYES control movement of appliances in tunnel between assembly and warehouse. The photoelectric cells hold appliances in groups until the main conveyor is clear.



PARTS AND PRODUCTS move between buildings in tunnels. Overhead conveyor carries parts; floor conveyor carries products. Space for truck travel provides maximum flexibility.

approximately 2000 feet long. Should physical expansion be in order, the present plant can be extended within that 2000-ft. limit.

Underground sewage and utility lines were laid originally so they would automatically come within the tunnels when the plant is enlarged. As the building is extended, present departments will stretch out as needed.

Other Key Features

ADJUSTABLE RESTROOMS · Sensing that the restroom requirements for men and women might change as layout changes were made, engineers made restrooms adjustable. Rooms for both sexes are provided on each mezzanine. An insulated steel panel wall separates them. This wall can be shifted either way quickly and easily as requirements change.

MAINTENANCE-FREE STRUCTURE · Sidewalls are 12 inches thick. One course of red brick was used outside. And the back-up wall is 8x8x4-in. concrete block. The brick is tied to the block mechanically every fourth row.

The roof is steel deck, with 1 inch of insulating board over it. That is topped with a built-up tar and gravel finish.

Floors are wood block, used for employee comfort, and for the ease of running service lines under it.

HEATING AND VENTILATING · Two types of steam-operated heaters are used—recirculating and fresh air. The amount of fresh air brought in is regulated by a thermostat responding to outside air temperature. Most heating units are in the perimeter areas and force heat toward the center. Forced ventilation is provided for summer months.

Eventually, the heating and ventilating units will be balanced to keep the plant under slight pressure to avoid drafts. Big process-air users, like the porcelain furnaces, will have their own air intake and exhaust systems.

WATER SUPPLY · Drains for water-cooled welders are overhead and in the floor. About 90% of the plant is sprinklered. The standpipe is located out of the way of future expansion. And the present outside sprinkler loop will become part of the inside loop when the building is extended (north end only).

POWER DISTRIBUTION · Power is supplied from roof vaults—five on each side of the plant. These penthouses have floor hatches that can be opened. In case it's necessary to lift heavy equipment to the vaults—or remove it—block and fall tackle can be used. Vaults are interconnected for emergency switching.

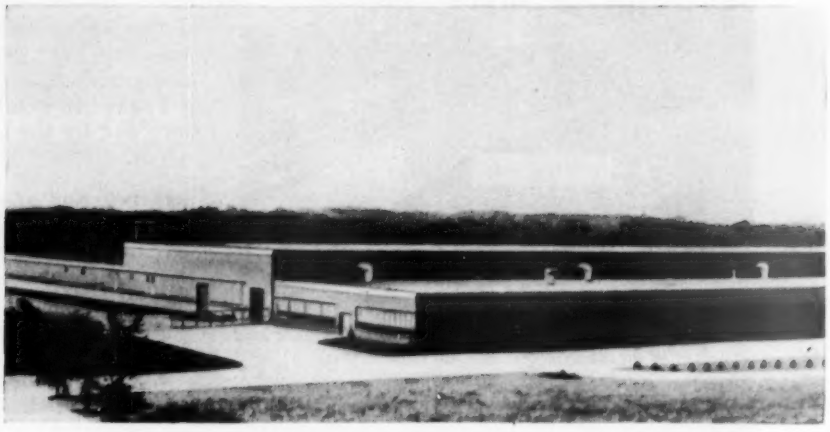
WASTE DISPOSAL · Underground tanks, of 40,000-gal. capacity, will hold industrial wastes, both acid and alkaline. And equipment will soon be installed to meter these effluents to a 66-in. storm sewer leading to the river. The metering device includes an automatic sampler that pulls six samples per hour from the big sewer. The idea is to dilute the effluent continuously so it will have little effect on aquatic life in the river. Raw sewage goes to the county treatment plant.

DUST AND FUME CONTROL · Fumes from the plating area are drawn down through gratings surrounding the tanks and into tunnels. These feeder tunnels lead to a master tunnel. This, in turn, leads to an underground room where fumes are washed out of the air. The cleansed air is then exhausted through the roof. Capacity of the system is 273,000 cfm.

All ducts and tunnels are concrete. The collecting basins are rubber- and tile-lined.

Metal finishing dust is drawn down alongside the finishing conveyors to a 48-in. concrete pipe. This leads to a dust removal system on the roof. After the air is cleaned, it is returned by a duct to the plant above the finishing area and exhausted through grills. Capacity is 140,000 cfm.

BETTER PLANTS
for today's...
and tomorrow's...
needs



Production Lines—in a Job Shop

FOR A GOOD EXAMPLE of a job shop that has found the way to adapt mass-production methods to its special problems, take a look at Atwood Vacuum Machine Company. In its 7½-acre plant in Rockford, Ill., Atwood decided to try something new—to set up production lines on which the majority of parts it makes could be manufactured in a "continuous flow."

Close to 2000 different pressed-metal products are in active production. Most of them require some machining. Like other companies with such a product mix, Atwood's old plant was laid out in the traditional job-shop manner. It had the familiar problems—too much materials handling, supervision difficulties, and production inefficiencies. A lot of arithmetic and imagination went into the new layout. Here are the benefits:

1. Less handling · Material was moved an average of 2500 feet under the old set-up. With the new layout—600 feet. Since they move about 4-million pounds of material per day, that's quite a saving. They used to have 22 hand truckers and 10 fork trucks; now do the job with 15 fork trucks.

2. More production · Production is up 15%, with the same number of workers and 20% *less* floor space. And, as the new system develops, a considerable reduction in production lead-time is expected.

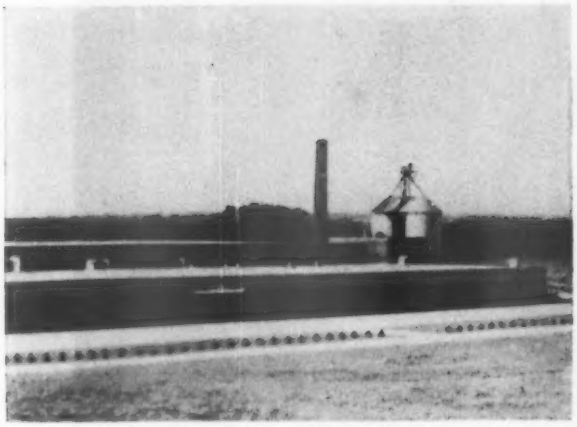
3. More effective supervision · Instead of having foremen in charge of a department, foremen are now in charge of one or more lines. They are responsible for making a part from the first operation to the time it enters finished parts stores. No more buck-passing, a well-known headache with

A SIGNIFICANT PLANT OF 1952-53

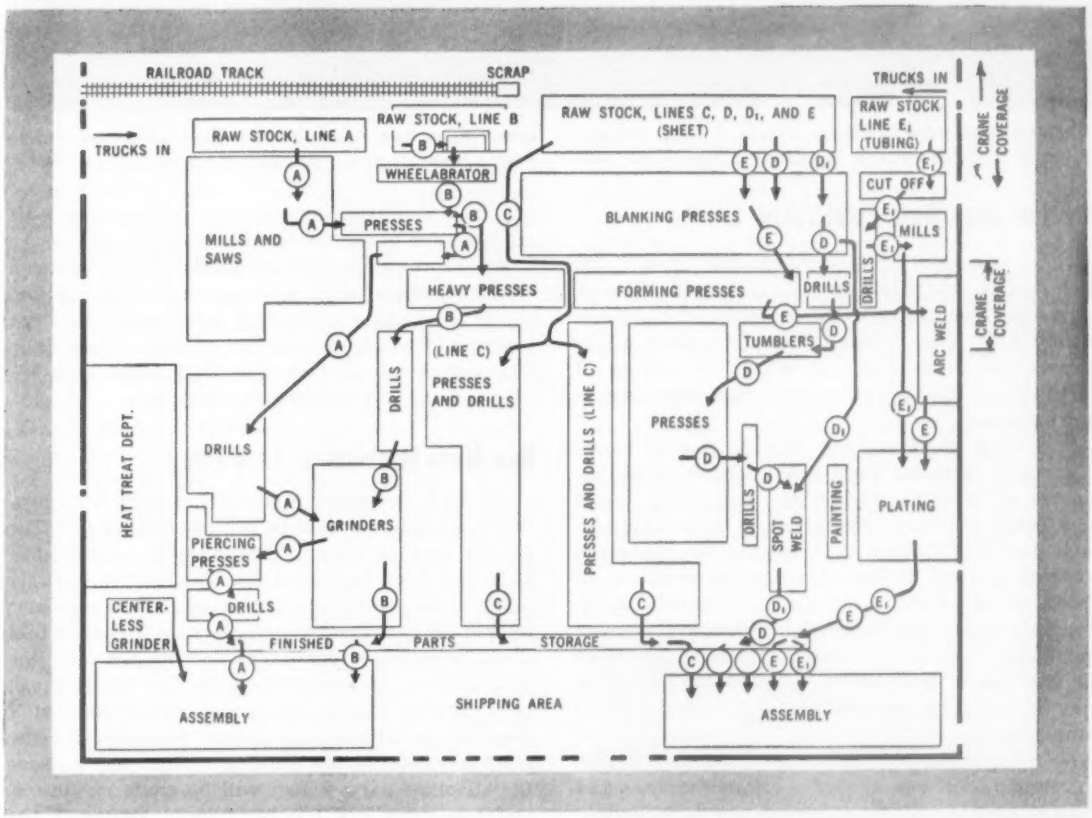
NAME: Atwood Vacuum Machine Co.
LOCATION: Rockford, Ill.

PRODUCT: Pressed metal products
EMPLOYEES: 700

ARCHITECT AND ENGINEER: Designed by Atwood staff
BUILDERS: Zinzow Construction Co., Elkhorn, Wis.



IN ITS NEW PLANT. Atwood Vacuum Machine Company found a way to utilize continuous flow for job-shop operations. Production increased 15%, with 20% less plant area than formerly.



UNUSUAL LAYOUT for this job shop. Each block represents a group of machines. Lettered arrows indicate main "production lines," flowing from raw materials stores at top to shipping at bottom. Sharing machines by adjacent lines adds flexibility.

departmentalized production. Atwood was able to reduce the number of foremen required in the production area by 25%.

4. Operators more efficient • Under the old set-up, a worker could have any of all 2000 parts come through his machine. Under the new set-up no more than 500 different parts come down any one line. Operators are more familiar with the parts, need less time to study the drawings and make set-ups.

Turn the page

FOREMEN ARE NOW in charge of one or more complete production lines instead of a functionalized department. New system makes them responsible for making a part from start to finish. Fewer foremen are needed. Supervision is better.

How the Lines Were Established

There are seven main "production lines." On each line, groups of machines are set up in different sequences. For example, the sequence of machines in line A is: saws, mills, presses, tumblers, drills, presses, and drills. This line is used to process all parts (about 500) requiring that particular operation sequence.

In setting up such lines, Atwood had to figure how many different lines were needed, what sequence of machines should be in each line, and how many machines should be in each group in each line. The number of lines and the sequences were established in this way: Atwood analyzed all orders for the previous 18 months. Analysts wrote down the sequence of operations necessary to make each part. They found that the great majority of all those parts (some 2000, as noted above) were manufactured by performing operations in one of six sequences.

As mentioned, 500 different parts, they found, were made in one sequence of operations—and machines set up in that sequence now form line A; 150 parts were made in the sequence which now forms line B; 400 called for line D sequence, 50 for D-1, 100 for E and E-1.

But they found that some 600 parts—totaling, however, only 10% of the total number of pieces manufactured—fit none of the sequences. Therefore, it was necessary to establish line C, which is a general-purpose press and machine line. On it are now manufactured any parts that cannot be made in one of the six fixed-sequence lines.

What's the minimum production that justifies a "fixed sequence" line? Atwood sets up a special line if the production volume of parts that "fit" that line would utilize the equipment 80% of the time. The lowest volume line (line E) handles only 5% of Atwood's total production volume.

How Many Machines in Each Line?

At each operation sequence in each line, how many machines should be put into the group? The easiest way to answer that is with an example. Let's say that their sales forecast for the next six months for part *X* was 500 per day. The sequence of operations necessary to make part *X* is such that it can be made on line *A*. The first operation on line *A* is sawing. Standards indicate that the saw can turn out 2000 of part X per day. Therefore, part X requires an average of ¼ saw per day, for the next six months. By making similar calculations for all other parts which will be made on line *A*, and totaling all of the "saw time" required, the number of saws for line *A* is determined.

In a similar manner, the number of machines required for subsequent operations on line *A*, and for machine groups on all other "fixed sequence" lines was established.

You've probably noticed that in some cases more than one line flows through a single group of machines. As long as this practice does not involve

any increases in distance parts must travel, there is no advantage to be gained in separating the machines into two or more groups. The "joint ownership" adds, in fact, a bit of flexibility. Since, for example, if line *B* is running behind and line *A* is not running fully loaded, more of the forming presses can be assigned to the burdened line.

The machine requirements for such a jointly owned machine group are calculated simply by adding the requirements of the separate lines.

Naturally, since the machine groups are set up on the basis of average times required by all parts, some thought is needed to keep the lines full. However, this is a matter for production planning.

How the Plan Works

Since product mix varies (Atwood is keyed to a large extent to the model changes of its largest customer group—the auto manufacturers), these line set-ups are not permanent. But bus duct and other plant services are located so that machines can be tapped in almost anywhere, and all machines (with the exception of heat treating, painting, a few large presses, and plating equipment) can be moved either by cranes or fork trucks.

If it appears that, despite the efforts of production planning, one line is losing volume at the expense of another line, machines are simply moved from one group to another group on the burdened line. It is a tribute to Atwood's planning that, in nine months since the plant was put into operation, only 25 out of the more than 600 pieces of production equipment have had to be moved because of changes in product mix. Future model changes in the auto industry will probably require more extensive changes. In order to minimize the production slow-down this will involve, the company is attempting to find out in advance what these customers' requirements will be, make projections of new line requirements, and shift gradually.

No "mechanical aids" were needed for calculations. Important to note: Atwood engineers made the calculations described above with simple arithmetic. A company, however, which has more parts might use such equipment as punched-card calculators to cut computation time.

No additional capital investment in equipment was required by this new type of layout, Atwood found. It bought some new equipment when it moved to the new plant, but this was for increased capacity. Machines now have less idle time than under the old layout. So the new layout, with an unchanged production volume, should require less equipment than a departmentalized layout.

Assigning the particular machine or machines within a machine group to work on a job is part of the foreman's responsibility, just as it was under the departmentalized set-up. But now, he has the advantage of knowing what parts are coming down the line. He can, to a large extent, figure what machines in the next group on the line will handle a particular parts order and get them set up in advance. As the foremen become more and more familiar with this system, Atwood looks for an appreciable reduction in the amount of time necessary to get parts through production.

The Handling Problem

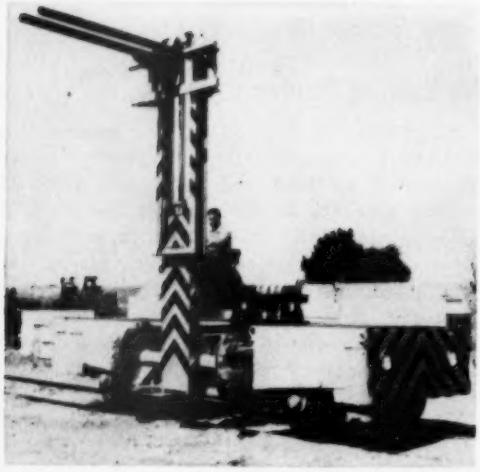
Naturally, the flow of parts is not so fixed as to allow the use of fixed conveyors, as would be the case on a "mass production" line. Each operator has three skid boxes, which are mounted on four-wheeled dollies. He takes parts to be processed out of the box on his left, places finished parts in the box on his right. When a box is filled, he pushes it behind him (towards the aisle). He takes the now-empty box on his left, puts it to his right—for finished parts. He then pulls into position on his left a new box of parts, which was placed there by an area fork truck. Since it takes about an hour to process a skid box of parts, the truck operator can take away a box of finished parts and replace it with a box of parts to be processed at any time during a two-hour period. The truck takes boxes of finished parts to the next machines.

Atwood also has about 50 gravity chutes and 200 portable power conveyors. These are "plugged in" wherever possible—that is, when succeeding operations are performed on adjacent machines.

SHORT-RUN DEPARTMENT · To avoid "cluttering up" the production lines with short orders (less than 2000 pieces), Atwood established a short-run department (3600 square feet) off to one side of the main production area. This department has 25 production machines, is operated on a job shop basis under one foreman.

SCALE MODEL helped sell idea of production flow. Material flows from storage near front to assembly and shipping in rear.

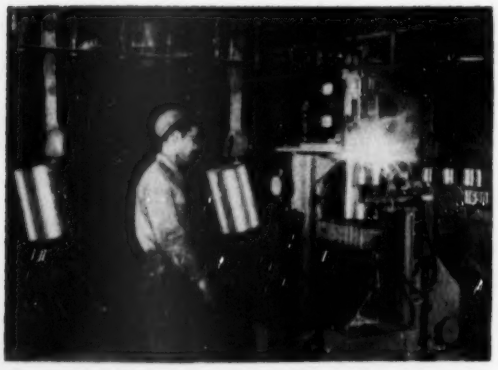
Quick Ideas for... Materials Handling



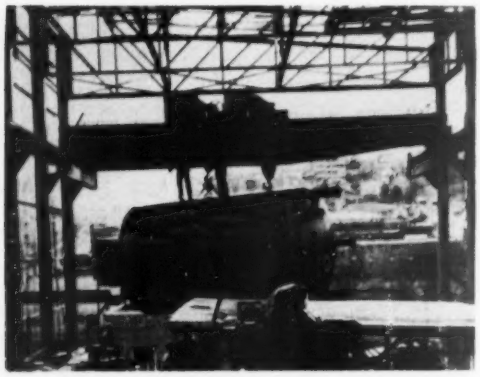
To move 3000-lb. coils of wire from outside storage to bolt-heading machines, Pittsburgh Screw & Bolt Corporation (Pittsburgh) adapted a standard Baker-Lull Traveloader.

Rail-travel wheels and rigid axles replace rubber-tired wheels and oscillating front axle. Operator's location was moved to a point directly behind the mast. Special forks were added to handle the coils.

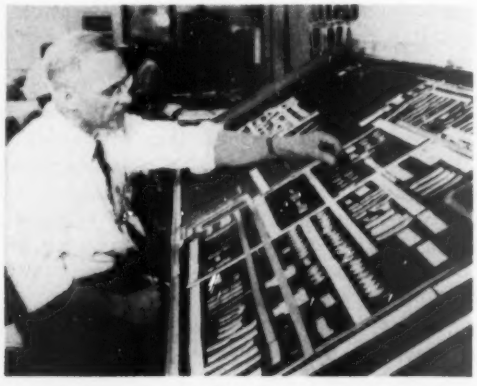
To pick up a coil the operator slides the mast forward to secure the coil on the forks. He retracts the mast to travel, then deposits the coil on a machine unreeler. Loading and unloading each requires approximately 20 seconds. One operator supplies wire for 39 machines.



To convey cylindrical billets through a furnace, U. S. Steel's National Tube Division (Gary, Ind.) uses a stud welder to attach hooks to the billets. Alloy-steel conveyor hangers pick the billets out of the welder, carry them continuously through a furnace. The stainless steel billets shown in the photo must be heated uniformly for extrusion into seamless tubing.

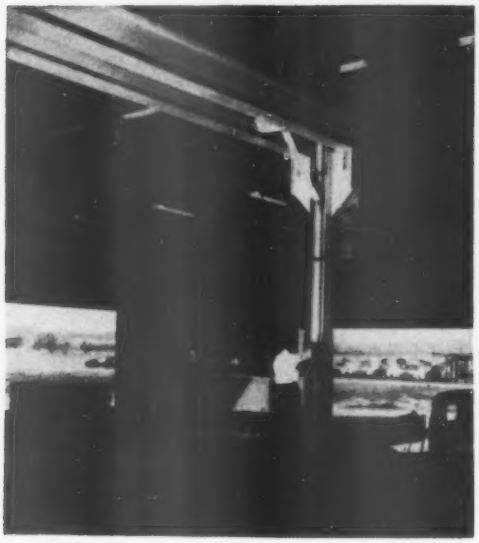


To pre-plan its handling system to grow with the plant, Puget Sound Pulp & Timber Company installed "half" a crane. When the company built a new plant, it already had plans for expansion. So it had this crane built so its span could be lengthened without completely replacing the girder. The girder now in use is a 39-ft. section of a 63-ft. girder. When the building is widened, the rest of the longer girder will be added to the present section.



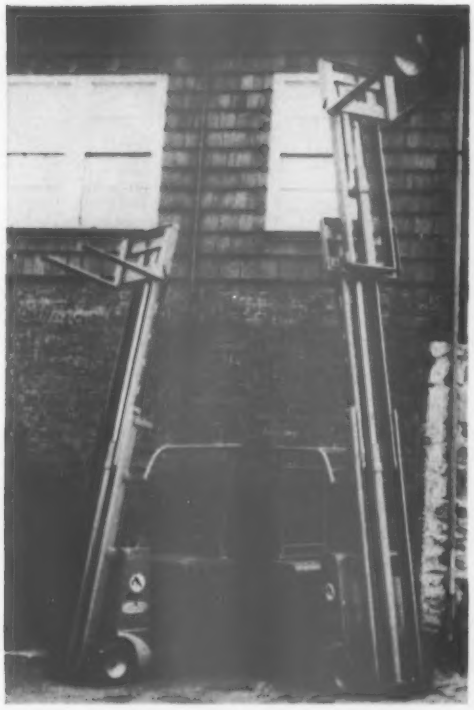
To plan plant layouts, Allis-Chalmers Manufacturing Company (Milwaukee) adapted a

method that's used to illustrate speeches. A floor area is represented by a board covered with a treated cotton cover (improved "flannel board"). Adhesive-backed Flok-Tite, a fabric type of material, is attached to the backs of paper templets representing equipment. The materials have an affinity for each other which holds the templets in place, even while the board is tilted.

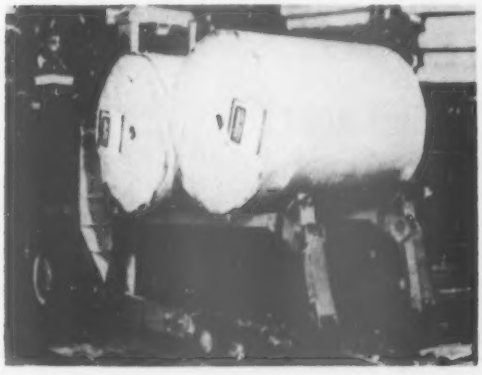


To eliminate dock delays due to truck maneuvering, Frigidaire Division (GMC), Dayton, uses a "straight-through" receiving dock. Flat-bed and open-top trucks enter the door at the left in the photo. An overhead crane unloads them. Then the trucks drive straight ahead, out through a door to the right (not shown). Double doors and plenty of apron area permit trucks to pass, instead of losing time waiting in line.

To unload a truck-load at a time (maximum unit load), Vacuum Cooling Co., El Centro, Calif., uses a lift truck with a special wide set of forks. A single pallet covers the entire bed of the trailer truck, holds 16,000 pounds of crated lettuce. The truck moves the pallet load from truck to processing.



To make better use of fork trucks and maintenance workers' time, Merchants Terminal, Baltimore, has a double set of masts for each of two fork trucks. One elevates to 158 inches for warehouse stacking. The other elevates a scaffold to 222 inches for maintenance workers to work on equipment at ceiling height.



To speed the moving of rolls of paper from storage to presses, W. F. Hall Printing Company, Chicago, doubled truck loads. A special platform truck with fork arms carries two rolls at a time. The arms are hinged near the ends to make them straight when lowered to the floor. Rollers at tips of the arms aid loading and unloading. When a load is lifted, the hinged sections drop down, raising stops that prevent the load from rolling off the fork.

See also FIELD REPORTS, page B-352

COMPARE 'EM IN ACTION ... at the Show

Easiest, Safest Fork Truck to Operate. *All NEW SpaceMaster Model "E" with magnetic controls. Change speed or direction by flick of one control lever . . . timed acceleration, no jumps or jerks. Dynamic Braking eliminates 99% of mechanical foot braking. Capacities to 4000 lbs.*

5th NATIONAL
MATERIALS HANDLING EXPOSITION
MAY 18-22, 1953
PHILADELPHIA

Make Your First Stop Lewis-Shepard . . .

pick up "Fork Truck Comparison Charts" to help you compare the various makes.

Most Stable Truck of its kind. *The NEW L-S SpaceMaster Model "M" permits high stacking in less than 6' aisles . . . and complete stability is assured with exclusive articulated linkage and stabilizing casters. Capacities to 3000 lbs. Models for both pallets and skids.*

For Speedy Horizontal Hauling. *This NEW SpaceMaster Model "M" low lift is ideal for long runs. Attains speeds over 4 mph . . . requires less room than walkie trucks. Capacity: 4000 lbs. Both pallet and platform models.*

MULTIPLY MANPOWER · LEWIS-SHEPARD ·

The "MASTER"® Line

A Quality Fork Truck at ½ the Cost. *Safety, stability, ruggedness . . . that's what the NEW SpaceMaster Model "J" gives you at half the usual outlay. The L-S one-design-line makes the low price possible. Capacities to 2000 lbs.*

The Quality Truck in the Walkie Field. *The NEW Jack-Lift Electric low lift truck with new powerful traction motor gives twice the speed. 15% less headroom makes narrow aisle operation easier. Capacities to 6000 lbs. in pallet and platform models.*

New Compact Design *of JackStacker Truck permits operation in more narrow aisles than ever before. Articulated linkage and two additional casters for high lift stability. Capacities to 6000 lbs. Models for pallets and skids.*

The largest group of NEW Lewis-Shepard Power Trucks ever offered...

PLUS units from the L-S line of Hand Lift Trucks, Floor Trucks, Stackers, Skids, Racks . . . your most complete choice of materials handling trucks.

At the Show, you'll see the most modern, economical, and space-saving trucks on the market . . . *right at the Lewis-Shepard Exhibit.* But don't take our word for it, make your own unbiased comparison—get the handy "Electric Truck Comparison Charts" that list important buying "guides" . . . let you evaluate the various comparative merits of each manufacturer's trucks.

Lewis-Shepard invites this comparison because we are confident that our complete line of materials handling equipment will give you more of the features you want, the quality you need, and the savings you expect. Be sure to pick up your "Comparison Charts" as soon as you arrive at the Show . . . or write for them now. Use the coupon below for your convenience.

LEWIS-SHEPARD Products, Inc.
106-5 Walnut Street, Watertown 72, Mass.

Send me "Comparison Charts" and Catalogs on the following:

- ☐ New SpaceMaster Model "E" Trucks
- ☐ New SpaceMaster Model "M" High and Low Lift Trucks
- ☐ New SpaceMaster Model "J" Trucks
- ☐ New JackStackers and JackLift Electric Trucks

Name _____

Company _____

Street _____ State _____

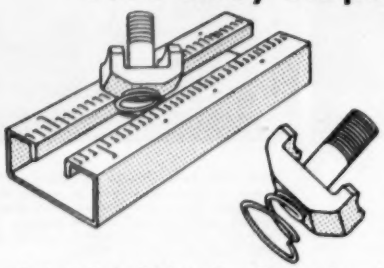
City _____

LEWIS-SHEPARD®

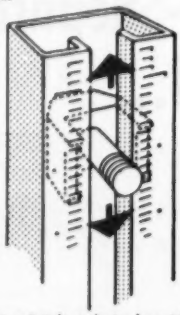
Nationwide Service — See "Trucks, Industrial" in your Yellow Phone Book

Announcing MULT-A-FRAME framing material

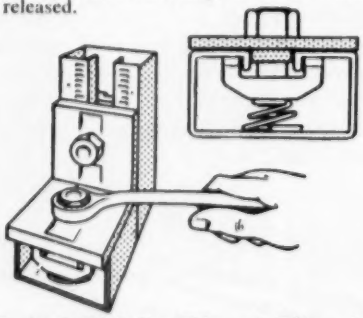
3 basic parts ...3 easy steps



1. Insert Spring-T-Bolt in Channel Frame slot and give one-quarter turn. Bolt slips in anywhere along frame slot; eliminates costly layout work, welding and drilling. Bolt stem is long enough to hold easily in fingers when inserted. No time wasted in jockeying a bolt or nut.



2. Locate Spring-T-Bolt at desired position in Channel Frame. Can be easily moved by sliding in slot. Released, spring holds T-Bolt in place. Spring on bolt head forces contact points into Channel Frame serrations. Spring-T-Bolt can't slip or twist unless released.



3. Attach Safe-Locking Fitting and tighten nut. Result: a solid box-section joint combining great strength and rigidity with lightweight. End view shows firm locking action of Safe-Locking Fitting. Raised nubs key it into Channel Frame slot, prevent rotation, sidesway or jackknifing.

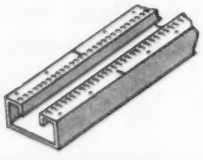
MULT-A-FRAME, amazing new fully-locking steel frame with "1000 and ONE" uses, lets you frame, hang or support anything faster, easier, at low cost!

No matter what your field—industrial, electrical, constructional or architectural, you can save planning time, man-hours, floor space and insurance costs with Ainsworth's exclusive new product, **MULT-A-FRAME.**

With just 3 basic units, **MULT-A-FRAME** provides skyscraper strength without bulk for pallet racks; skid racks; racks to hold pipe, wire, steel, glass, tires, barrels, sheet metal parts; lighting-fixture hangers; pipe, radiator and conduit supports; floor, wall and ceiling inserts; workbenches; scaffolds; platforms; rigs; cribs and mobile parts carriers.

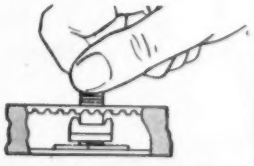
Only MULT-A-FRAME

SIMPLE TO MEASURE



Channel Frame has rolled-in dots to show inches, dashes to show feet. You can measure lengths quickly, *accurately*.

EASY TO HANDLE



Head of Spring-T-Bolt fits in frame. Shank extends, so workman can grip it easily without putting fingers inside channel.

Visit us at the National Materials Handling Exposition in Philadelphia, May 18 to 22 • Booths 1818-1822

Created exclusively by Ainsworth—

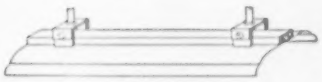
MULT-A-FRAME is a product of Ainsworth Manufacturing Corporation, for 37 years specialists in a wide range of stamped-metal products for the automotive industry, government and other fields. Over the years, Ainsworth has grown to a total of 380,000 sq. ft. of floor space and over 2,500 employees. Instrumental in this growth is Ainsworth's reputation for quality and dependability—a sure sign that you can depend on MULT-A-FRAME, too!

...World's only fully-locking ...by Ainsworth!

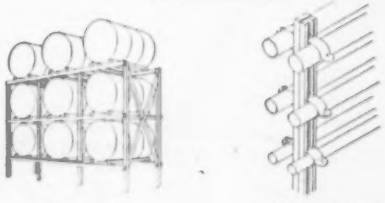
MULT-A-FRAME requires no welding, drilling, special tools or special skills to construct, yet assemblies are designed to hold many tons. To meet varying demands, it is made in both Standard and Heavy-Duty Channel Frames. Completely salvable, **MULT-A-FRAME** can be used over and over again, assembled and reassembled without scrapping *any* part!

See how **MULT-A-FRAME** can be designed to fit your individual requirements, save you time and money! Authorized distributors in all principal cities provide engineering service and prompt delivery from warehouse stocks. Write, wire or phone for free samples and catalog to *MULT-A-FRAME DIVISION, Ainsworth Manufacturing Corporation, Dept. 112, 1471 East Atwater St., Detroit 7, Mich.*

Scaffolds Shelving Concrete Inserts



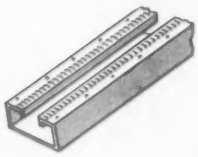
Lighting-Fixture Hangers



Barrel Racks Conduit Supports

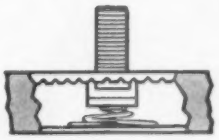
gives you all these advantages

FULLY ADJUSTABLE



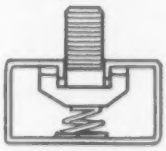
Both edges of channel slot are serrated. You get complete adjustability of fittings to suit any and all requirements.

SLIP-PROOF GRIP



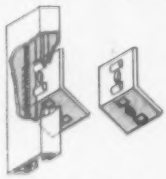
Spring-T-Bolt has contact points which lock into Channel Frame serrations when bolt is tightened. Result: a slip-proof grip.

BOLT PROTECTS FLANGE

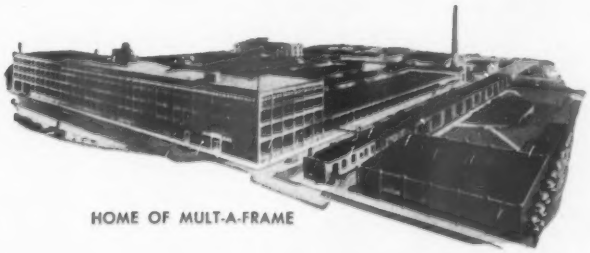


Edges of Spring-T-Bolt fit over and around flange. Danger of flange spreading, twisting or warping is eliminated completely.

FITTINGS KEY INTO FRAME



Safe-locking Fittings have raised nubs that key into Channel Frame slot, prevent rotation, sidesway and jackknifing.



HOME OF MULT-A-FRAME

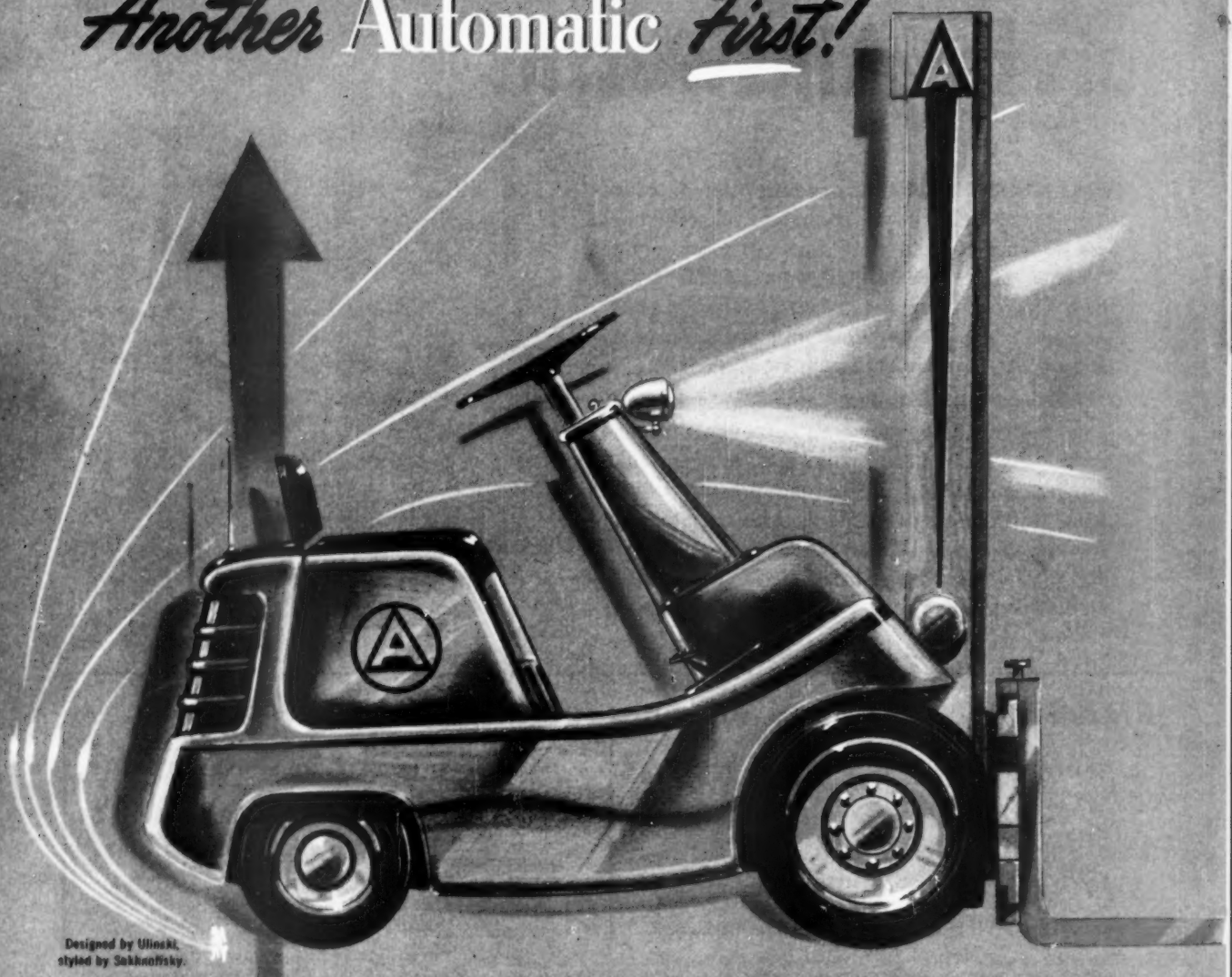
MULT-A-FRAME
AINSWORTH DETROIT, U.S.A.

*Trade mark, Patents Pending

MULT-A-FRAME DIVISION
1471 East Atwater St. • Detroit 7, Michigan

Ainsworth Manufacturing Corporation

Another Automatic *First!*



Designed by Ulinski, styled by Sakkmoffsky.

HERE'S WHAT DYNAMOTIVE ELECTRIC TRANSMISSION MEANS TO YOU:

No gears to shift • No clutch to manipulate • No engine shock due to clutching • No hydraulic torque converter • No over-drive mechanism • No mechanical connection from engine to drive unit • Maximum comfort and ease of operation for driver • Foot operated lift and tilt • Interlocked dual brake system for maximum safety • Electric truck reliability • Infinite acceleration range with minimum power loss • Engine speed automatically adjusts to load requirement • Minimum engine wear—maximum life • Less fuel consumption • All advantages of torque converters and overdrive without mechanical devices • Minimum down time • Maximum accessibility • No aisle projections.

Plus these Automatic industry-proved features:

Silicone insulation for drive motor and generator • Heavy section rolled manganese alloy steel uprights • Ball bearing mounted carriage and upright rollers • Hydraulic safety fuses (with duo lift).

Automatic ® 39 W. 87th St., Dept. E-3
Chicago 20, Illinois

Please send me information about your new Dynamotive Gas-Electric truck.

Company Name_____

By_____ Title_____

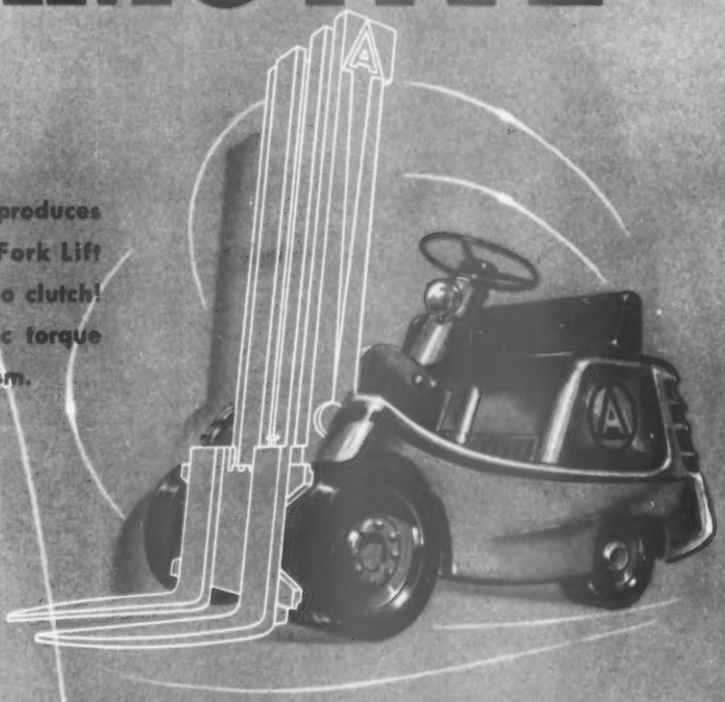
Street Address_____

City_____ Zone____ State_____

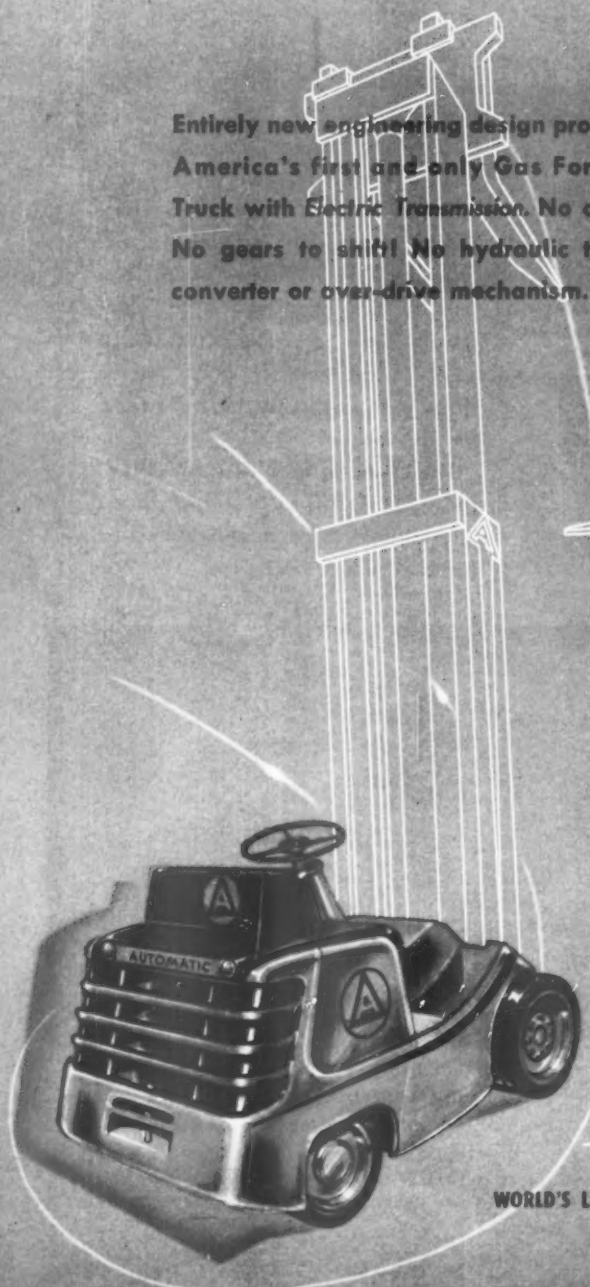
AMERICA'S FIRST GAS TRUCK WITH ELECTRIC TRANSMISSION

The new Automatic

DYNAMOTIVE



Entirely new engineering design produces America's first and only Gas Fork Lift Truck with *Electric Transmission*. No clutch! No gears to shift! No hydraulic torque converter or over-drive mechanism.



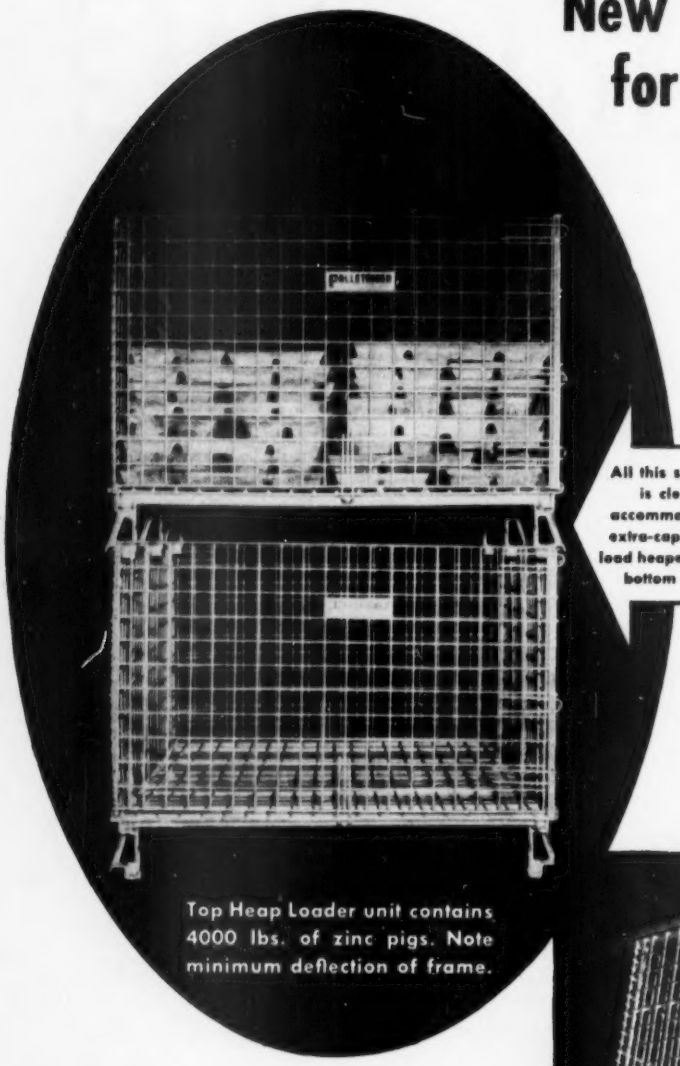
This new Dynamotive Gas Truck does for users of materials handling equipment what modern diesel-electric power has done for American Railroads. Its electric, infinite step transmission has no mechanical connections . . . transmits no "clutch shock" to engine... but brings to your materials handling jobs that fully controlled smooth flow of power which insures maximum economy and efficiency.

Automatic

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC DRIVEN INDUSTRIAL TRUCKS

PALLETAINER

New "Heap Loader" model for heavy bulk materials

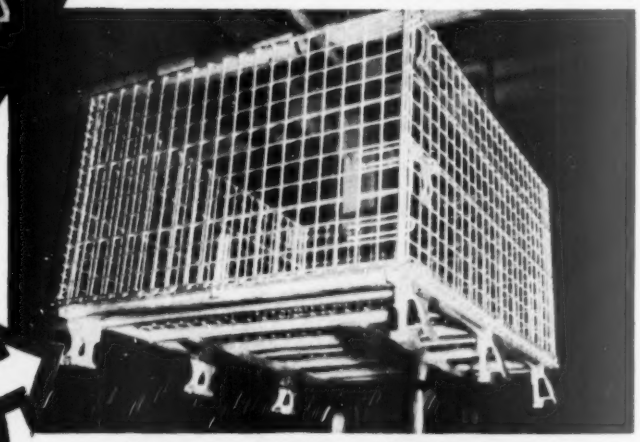


Top Heap Loader unit contains 4000 lbs. of zinc pigs. Note minimum deflection of frame.

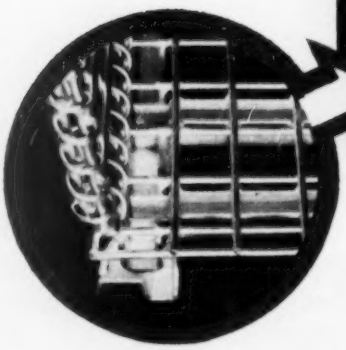
Go right ahead . . . fill 'er to overflowing. With the new "Heap Loader" PALLETAINER you can still stack 'em solidly, even when loads are heaped well above the top rod!

The frame of the new "Heap Loader" features steel U-channel beams interlocked and welded for square channel strength. Famous PALLETAINER construction of reinforced electro-welded steel rods is virtually indestructible. Center legs are eliminated. Malleable steel corner legs need no bracing. Entire under-area is clear to accommodate extra-capacity load heaped on unit below.

The "Heap Loader" PALLETAINER, in 2,000, 4,000 or 6,000 lb. capacity models, is especially suited to handle bulkier materials.

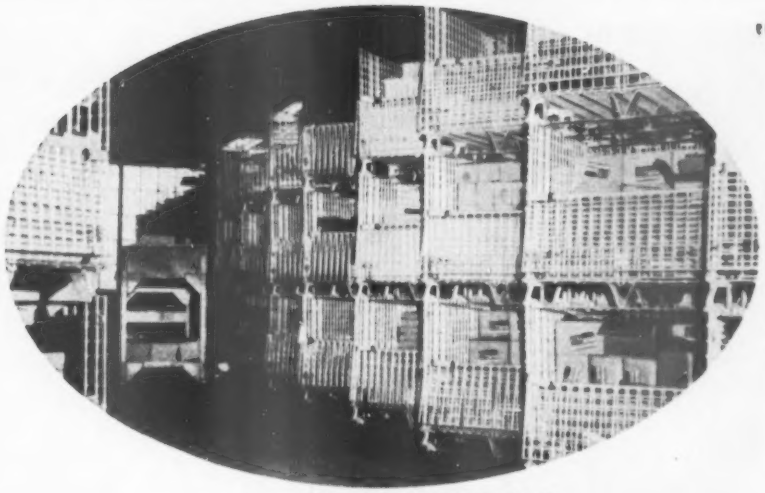


New undercarriage provides maximum ease of entry for lift trucks. Note how cross beams give added protection for load.



See how steel U beams are interlocked and welded to keep frame of Heap loader rigid under extra-heavy loads.

VERSATILITY



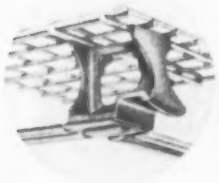
WAREHOUSING

"Warehouse" Palletainer cuts inventory costs

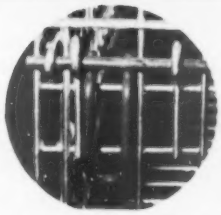
Special "WAREHOUSE" PALLETAINER is a real time and labor saver. Contents are always visible for quick inventory. Hinged front section permits unusually quick access even when units are stacked. WAREHOUSE PALLETAINERS are widely used for makeup operations and for temporary storage of nearly every type of goods. Anything contained by a 2" mesh can be stored more quickly and safely in PALLETAINERS.

"Standard" Palletainer for production and shipping

Here's how many manufacturers enjoy PALLETAINER dividends. Units are placed in foundry, pressroom and assembly line. Natural receptacles for forgings, stampings or finished parts, they are moved quickly and easily from one operation to the next. When the final process is completed contents *remain* in PALLETAINERS for temporary storage or for actual shipment! Virtually indestructible steel rod construction assures maximum protection on the move. Costs are cut further when empty PALLETAINERS fold to ¼ depth for return trip.



MALLEABLE CAST LEGS are available on any standard PALLETAINER model for greater unit capacities, simplified stacking and higher safety margin.



NEW LOCKING DEVICE on all PALLETAINERS holds sides securely, *regardless* of load. Cannot be released accidentally, cannot be lost in shipment.

Whatever your handling needs, one of the many PALLETAINER *models may solve it. Now's the time to learn how little it costs to enjoy these* PALLETAINER *savings. We'll be glad to survey your needs at your convenience.*

UNION STEEL PRODUCTS COMPANY

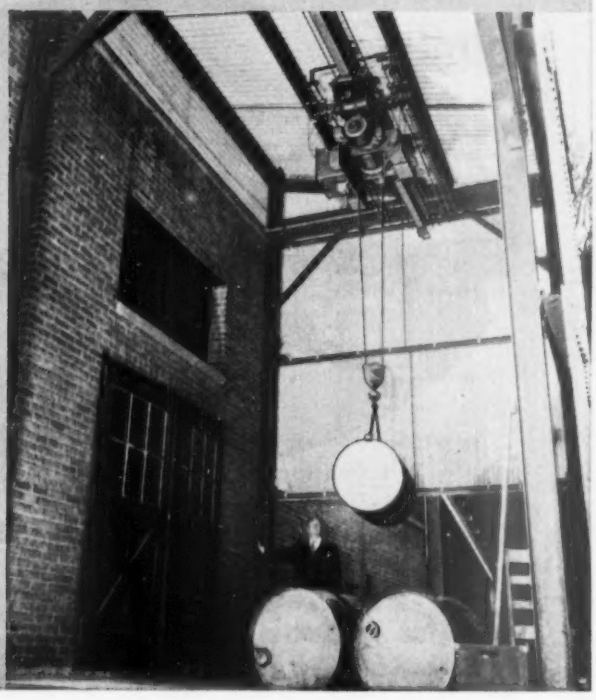
Albion, Michigan 1903 *Our Golden Anniversary* 1953

Cuts Die-Handling Time in ½

A large aircraft builder wrote: "Time and handling in this operation have been cut approximately in half by use of the Tramrail. In addition, operators report much greater safety and less danger of personal injury in handling heavy parts."

Automatic System Eliminates Three 10-ton Trucks

The need of three 10-ton trucks to haul materials between buildings was eliminated by a Cleveland Tramrail automatic dispatch system which does the job quickly without attendants accompanying. In addition, many man-hours of working time are saved daily and the load on an elevator is greatly reduced.



5th NATIONAL MATERIALS HANDLING EXPOSITION
MAY 18-22, 1953
PHILADELPHIA

SEE OUR EXHIBIT AT SPACE No. 1325-A

40,000 CLEVELAND TRAMRAIL NOW SERVE INDUSTRIAL

If you do not have an accurate cost record of all of your manufacturing operations, you may be astounded at the tremendous price you are paying to pick materials up, move and set them down. This may be your biggest expense item.

Illustrated here are a few actual case examples of the great savings and other important advantages

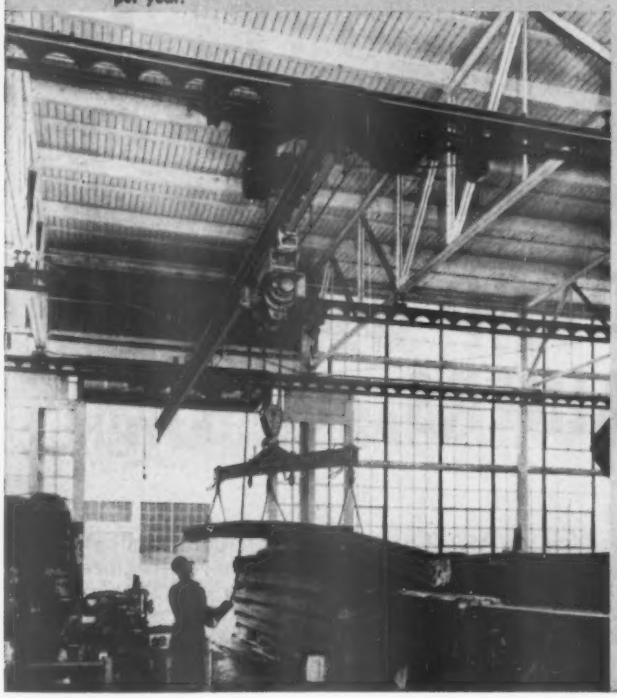
GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3264 EAST 284TH ST., WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

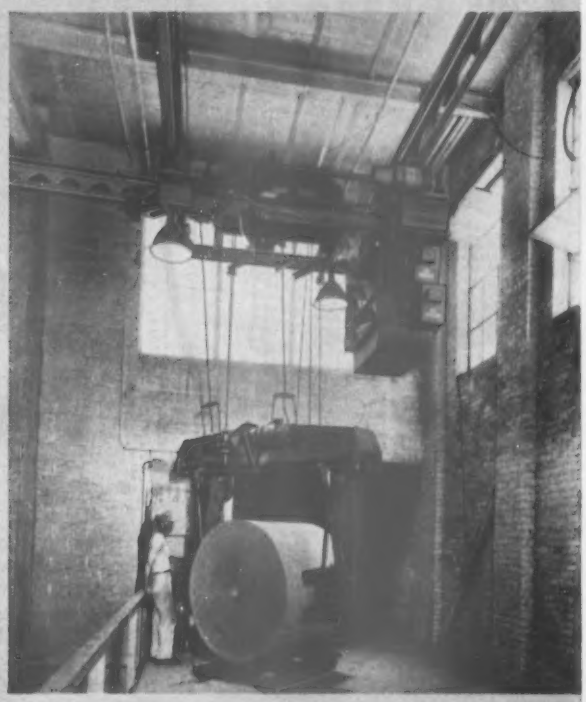
Saves $5,000 Yearly on Steel Cost

A West Coast manufacturer installed a completely motorized 5-ton Cleveland Tramrail transfer bridge that interlocks with an outside track over a railroad siding. Because this enables handling 5-ton bundles, a $2.00 per ton bundling charge is saved on steel purchased. Handling time is also saved. Since 200 tons are used monthly the total savings amount to $5,000 per year.



7,500 lbs. Paper Spoilage Saved Daily

Among other important cost-reducing advantages, this cab-operated crane with motorized roll grab in a large paper warehouse, cuts damage losses by 1% of total tonnage handled. Approximately 150 rolls weighing 750,000 lbs. are handled daily.

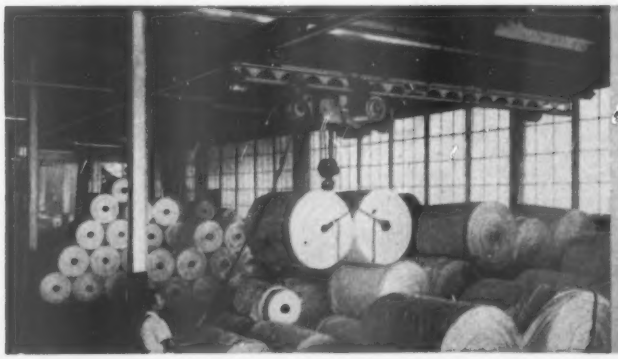


INSTALLATIONS AMERICA

Cleveland Tramrail has brought about in nearly every industry. Most likely you, too, have materials handling jobs in your plant from which big savings can be made. Why not have our engineers make a study and present recommendations, without obligation, of course?

Foundry Jumps from 3 Heats to 8 Daily

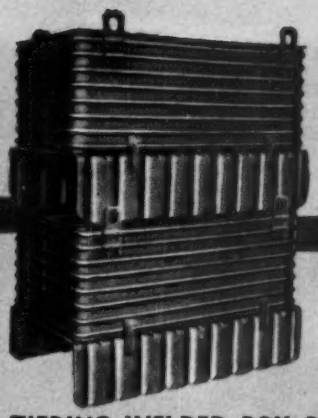
With no increase in man power, the installation of an inexpensive Cleveland Tramrail handpropelled system in a small brass foundry, made a terrific difference in their operations. It made possible 8 heats a day instead of 3, formerly usual. Despite more than double output, the men are less fatigued now at the end of a day.



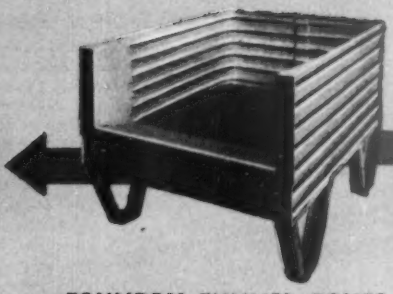
Increases Roll Storage Capacity 50%

The 400-lb. cloth rolls in foreground could only be piled two high until the Tramrail bridge was installed. Now one man can pile them three high easily. He can also deliver them to other parts of the building on the bridge and overhead track, directly without rehandling, thus cutting cost in this way, too.

POWELL
PRESSED STEEL
SINCE 1920



TIERING WELDED BOX PLATFORMS



FOUNDRY FUNNEL BOXES

STANDARD and JOB-CONTAINERS FOR EVERY

Whatever your handling job Powell has a serviceable durable all-steel container that will exactly fit job requirements. Powell engineers, backed by more than 30 years experience in designing and building containers for moving or storing purposes of every description, are best qualified to help you achieve the most efficient handling system possible.

For more inexpensive plant operations, for better materials handling, call in the Powell man in your area—he is a materials handling expert and the one man who can best help you lower your handling costs.

Pictured are a few of the many basic types of containers designed and built by Powell. These containers can be made in size and style to exactly meet your job requirements.

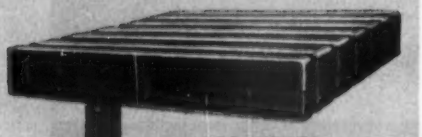
TIERING WELDED BOX PLATFORMS—Heavy duty boxes that will hold anything . . . can be tiered to almost any height.

FOUNDRY FUNNEL BOXES—For handling hot castings these sturdy open end boxes are doing a job for America's leading foundries.

FOUR-WAY CRANE TIERING BOXES—Standard boxes with slots for four-way lift truck entry . . . crane lift attachments.

HOPPER BOXES—Ideal for small parts handling. Powell Hoppers eliminate need for special table. Can be made with various door openings. Available in slanted gravity feed or straight bottoms.

ROLL-OVER BOXES—For use where volume and constant material flow are essential. Powell Roll-Overs enable quick filling of press hoppers, conveyors, etc.

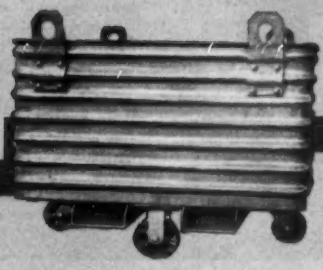


ALL-STEEL
REVERSIBLE PALLETS

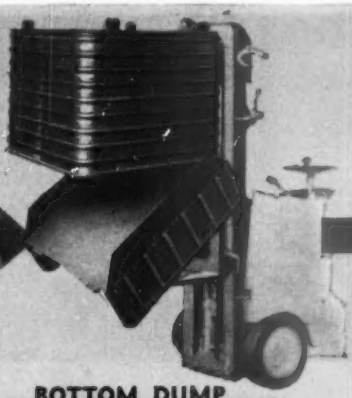
NE EEL
NESTIN ALLETS

LIFT TRUCK
PLATFORMS

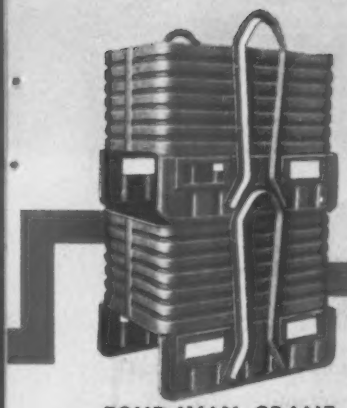
BE SURE TO SEE OUR EXHIBIT
at the MATERIALS HANDLING
EXPOSITION—BOOTH No. 1440



ROLL-OVER CASTER BOXES



BOTTOM DUMP
PLATFORM BOXES



FOUR-WAY CRANE TIERING BOXES

HOPPER BOXES

ROLL OVER BOXES

DESIGNED ALL-STEEL MATERIALS HANDLING PURPOSE

DUMP BOXES—Dumps for every purpose . . . sizes can be built for your particular operation.
BAR CARRIERS—If you're handling long items, rails, pipe, conduit, tubing, bars, etc., a Powell Carrier can be built to do a more efficient job.
STACKING PALLET-RACKS—Durable racks built to handle large or bulky materials, such as crank shafts, which will not readily carry in a box type unit.
WAREHOUSE UNITS—For handling those hard-to-handle materials, bagged goods, etc., the Powell Warehouse Unit is unsurpassed.
CASTER-BOTTOM DUMP UNITS—Extremely flexible caster bottom dump boxes can be handled in normal manner with lift truck, can be roll-over dumped, can be tiered—and they will roll easily on their own casters.
LIFT TRUCK PLATFORMS—Standard units that can be made in many sizes and styles to best suit your particular job.
NESTEEL STACKING PALLETS—Sturdy, one-piece, all-steel pallets that nest one into the other. Ideal for ship-and-return use. (Special Bulletin on Request.)
WELDED STEEL PALLETS—Standard all-steel pallets of basic designs to suit your needs.
SPECIAL—If you have a need for a special container remember Powell is the world's most experienced manufacturer of all-steel handling containers. Call your Powell representative or write direct.

CASTER BOTTOM DUMP UNIT

BAR CARRIERS

PALLET RACKS

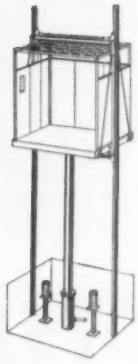
WAREHOUSE STACKING UNITS

THE POWELL PRESSED STEEL CO., HUBBARD, OHIO
ORIGINATORS OF COLD FORMED ALL STEEL HANDLING EQUIPMENT
(In Greater Youngstown)

POWELL PRESSED STEEL
Since 1920

Rotary
OILDRAULIC ELEVATORS

No penthouse or heavy sidewalls needed



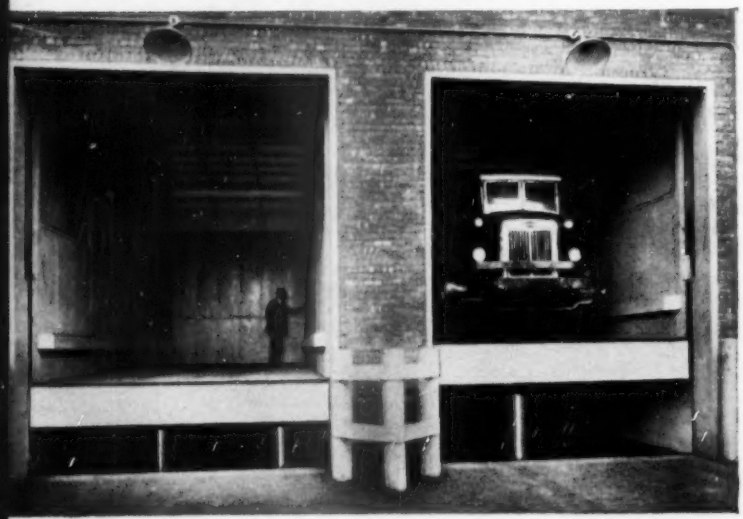
Rotary Oildraulic Elevators are moved and controlled by oil under pressure, the most powerful and economical method of lifting heavy loads. Because the elevator car and its load are supported by the hydraulic system, you can leave off the penthouse and substantially lighten the shaftway structure. Rotary's compact power unit can be located on any landing or placed in an area with other mechanical equipment.

Smooth starts, accurate landings—The revolutionary Rota-Flow oil-hydraulic power system gives velvet-smooth starts and cushioned stops. Oildraulic automatic floor leveling positions the car to each landing with exactness . . . 1/4 inch accuracy guaranteed. Our Engineering Department and nation-wide field organization will be glad to work with you on preliminary layouts and specifications. Write for catalogs and complete architectural data.

ROTARY LIFT CO.
1096 Kentucky, Memphis 2, Tenn.

Engineered for power truck loading

Oildraulic Freight Elevators are built to withstand the shock loads imposed by power trucks and tractors with heavy loads. Deep-formed, electrically welded members give strength and rigidity. The elevator car is supported by the "oil-locked" hydraulic jack.



Handle loads up to 100,000 lbs.

Some of the largest elevators in service today are Rotary Oildraulics. The ones pictured above are 60,000-lb. capacity for raising and lowering heavy trucks. There are substantial savings on installation and operation costs of heavy-duty Oildraulic Elevators for rises up to 50 feet.

Unexcelled for passenger service

Oildraulic Elevators for passenger service are built in sizes and capacities as specified, with any desired types of cabs, doors and controls—for attendant or self-service operation. You can depend on these passenger elevators for smooth, quiet, economical service.

Rotary
OILDRAULIC

RAMPS · LIFTS

LEVA-DOCK

Adjustable hydraulic ramp for loading docks

The Leva-Dock is a hinged ramp positioned by hydraulic jack. Four sections rest on truck or trailer bed and travel up or down as loading or unloading progresses. The new Leva-Dock makes it possible to handle heavy loads in and out of trucks and trailers—without using steel plates, bridge ramps or other slow and frequently dangerous methods. The platform will support 20,000 lb. loads rolled in any direction, and becomes part of loading dock floor when not in use. A new automatic safety device prevents accidents and costly delays.

The new Leva-Dock is a rugged, self-contained unit with power system and oil reservoir mounted in torque-tube frame. Installation is simple and inexpensive.

Hundreds of material handling men were interviewed, thousands of loading docks checked before the new Leva-Dock was designed and engineered. It's Rotary's practical, economical answer to the loading dock problem.

This new automatic ramp compensates four ways for varying truck bed heights, out-of-level trucks, and truck spring deflection during loading and unloading.

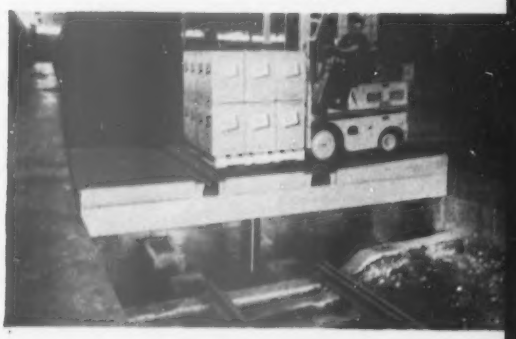
OILDRAULIC LIFTS to speed operations and cut costs

LEVELATOR LIFT

Raise loads by hydraulic power directly from plant floor to trucks, freight cars or different building levels. Levelator Lifts speed plant traffic and save valuable floor space. When lowered, the platform becomes part of floor and can be trucked over in any direction. Levelators are available in any size and capacity needed.

MACHINE-FEEDING LEVELATOR

Use hydraulic power, not men, to raise and lower heavy stock. Materials are always at most convenient height for fast, continuous feeding. Production rates of machines can be maintained at top levels. Safe, dependable, economical hydraulic operation. Equipment can be custom-built to fit your requirements.



OILDRAULIC TRANSFER BRIDGES

This hydraulically operated bridge forms a roadway to permit plant traffic to move quickly across spur tracks. Eliminates detours and congestion. When lowered, the rails on the Transfer Bridge become a part of the railroad track. Dual-jack, drawbridge or other types of transfer bridges are also built by Rotary.

Rotary® OILDRAULIC®
ELEVATING DEVICES
for modern plants

Write for catalogs

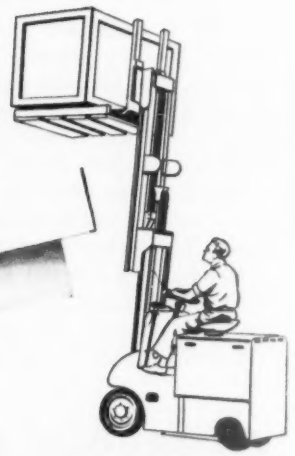
- ☐ *Freight Elevators*
- ☐ *Levelator Lifts*
- ☐ *Passenger Elevators*
- ☐ *Machine-Feeding Lifts*
- ☐ *Leva-Dock Ramps*
- ☐ *Transfer Bridges*

ROTARY LIFT CO. 1096 Kentucky, Memphis 2, Tenn.

The NEW T-H Exide-Ironclad

★ 20% more capacity in the same space

★ Lowest cost per A.H. to own and operate



Heavier demands on all types of battery-powered haulage equipment dictate the need for batteries with greater capacity.

The new Exide-Ironclad T-H battery gives 20% more capacity in the same space—WITHOUT SACRIFICE OF LONG LIFE for which Exide-Ironclad Batteries are famous.

This new T-H battery is of the time-tested Exide-Ironclad construction, employing the exclusive slotted tube positive plate. New materials have made structural changes possible, which permit the use of larger positive plates—resulting in increased capacity.

The T-H line of Exide-Ironclad Batteries includes capacities for all battery-powered haulage units.

See Exide at the Materials Handling Exposition May 18-22, Philadelphia Space 1549

Now-more than ever before... YOUR BEST POWER BUY AT ANY PRICE!

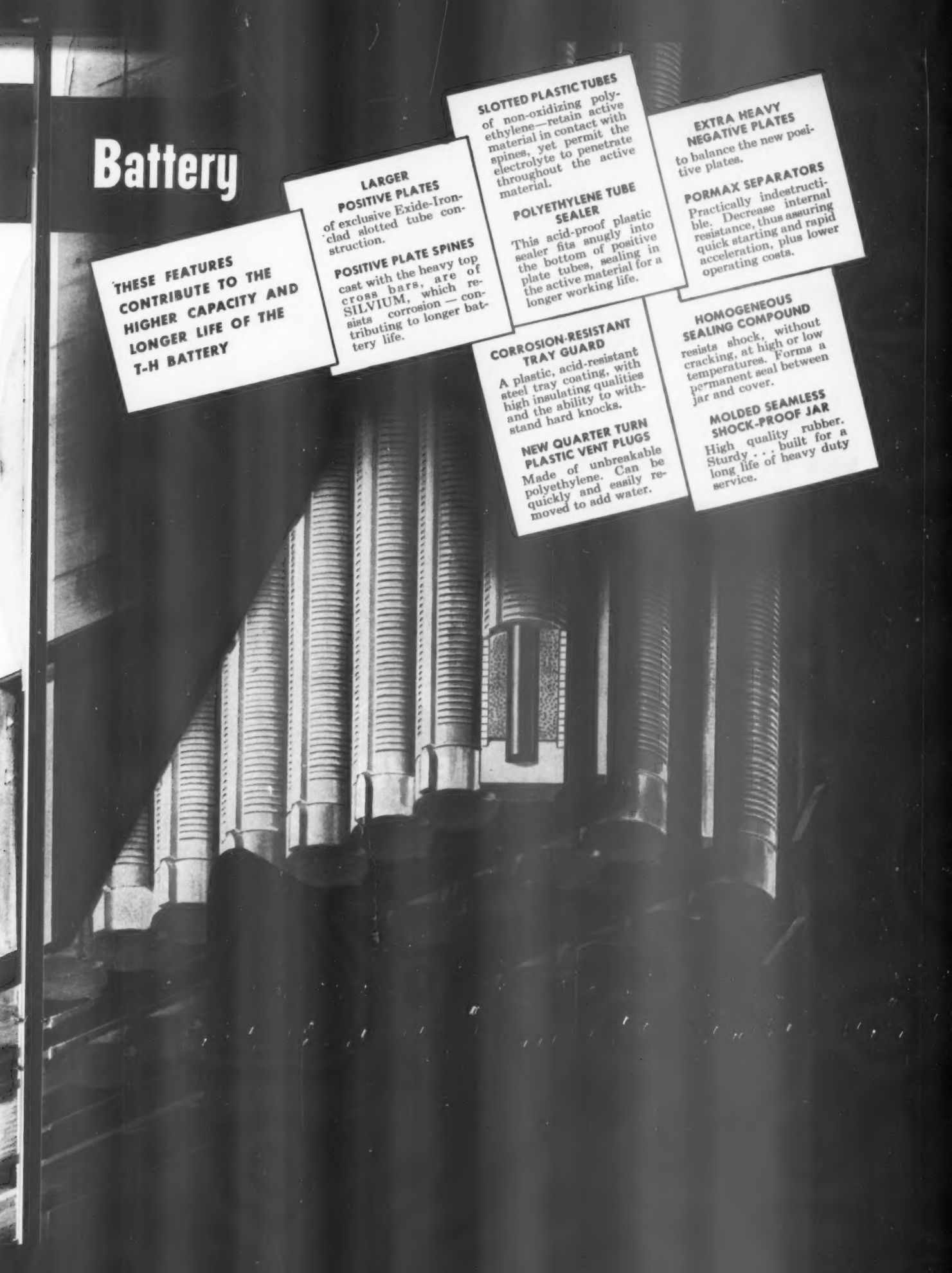
Thrifty Hauler

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2

Exide Batteries of Canada, Limited, Toronto

1888—DEPENDABLE BATTERIES FOR 65 YEARS—1953

"EXIDE", "EXIDE-IRONCLAD", "SILVIUM", "PORMAX", *Reg. T.M. U.S. Pat. Off.*


Battery
THESE FEATURES CONTRIBUTE TO THE HIGHER CAPACITY AND LONGER LIFE OF THE T-H BATTERY
LARGER POSITIVE PLATES
of exclusive Exide-Ironclad slotted tube construction.
POSITIVE PLATE SPINES
cast with the heavy top cross bars, are of SILVIUM, which resists corrosion — contributing to longer battery life.
SLOTTED PLASTIC TUBES
of non-oxidizing polyethylene—retain active material in contact with spines, yet permit the electrolyte to penetrate throughout the active material.
POLYETHYLENE TUBE SEALER
This acid-proof plastic sealer fits snugly into the bottom of positive plate tubes, sealing in the active material for a longer working life.
EXTRA HEAVY NEGATIVE PLATES
to balance the new positive plates.
PORMAX SEPARATORS
Practically indestructible. Decrease internal resistance, thus assuring quick starting and rapid acceleration, plus lower operating costs.
CORROSION-RESISTANT TRAY GUARD
A plastic, acid-resistant steel tray coating, with high insulating qualities and the ability to withstand hard knocks.
NEW QUARTER TURN PLASTIC VENT PLUGS
Made of unbreakable polyethylene. Can be quickly and easily removed to add water.
HOMOGENEOUS SEALING COMPOUND
resists shock, without cracking, at high or low temperatures. Forms a permanent seal between jar and cover.
MOLDED SEAMLESS SHOCK-PROOF JAR
High quality rubber. Sturdy . . . built for a long life of heavy duty service.

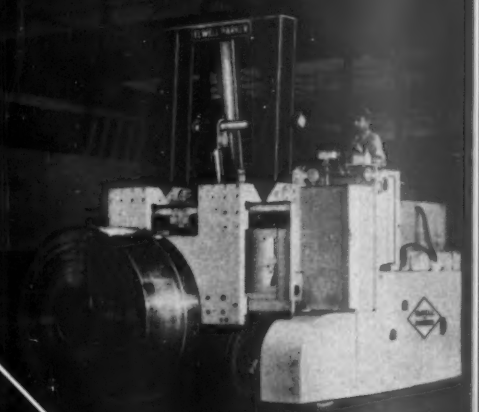
"Better Plants" use Elwell-Parkers

Advance planning of a materials handling system with the help of an E-P Field Engineer will insure *maximum efficiency* from your new plant.

Your E-P man will see that the trucks synchronize the flow of materials to match output of machinery. He will also avoid aimless "cross handling" and see that full advantage is taken of the truck's ability to save storage space.

Likewise, *in existing plants,* Elwell-Parker Field Engineers can eliminate wasteful handling methods.

There are 40 of these truck specialists, resident in all principal cities. Their average experience exceeds 15 years. Benefit by this unique experience . . . Get the *best possible* truck performance at no extra cost . . . Write The Elwell-Parker Electric Co., 4024 St. Clair Ave., Cleveland 3, Ohio.



ELWELL - PARKER

Customer Satisfaction is many things...

ELWELL-PARKER

Specially engineered cradle attachment enables E-P fork truck to speed up work in textile plant.

for example:

DELIVERIES AS PROMISED—Buyers of Elwell-Parkers never lose valuable time because trucks do not arrive on schedule.

UNEXCELLED SPARE PARTS SERVICE—For years Elwell-Parker has promptly furnished 85% to 90% of all required replacements out of stock.

FREE INSPECTION SERVICE—Owners of Elwell-Parkers are usually visited at least twice a year by E-P Service Engineers. They advise on preventative maintenance and proper operation . . . are available for consultation on emergency problems.

SPECIAL ENGINEERING—E-P experience in designing "special" trucks or attachments for unusual load conditions is *unmatched.*

SUPERIOR QUALITY—is the *main reason* why Elwell-Parker customers are so satisfied. E-P trucks commonly give 15 to 20 years reliable service. "*They are built to match the finest machinery in your plant.*"

GET THE FACTS—Write for this complete catalog. The Elwell-Parker Electric Co., 4024 St. Clair Ave., Cleveland 3, Ohio.

SEE THE NEW ELWELL-PARKER MODELS AT THE MATERIALS HANDLING SHOW

ELWELL-PARKER

POWER INDUSTRIAL TRUCKS

Established 1893

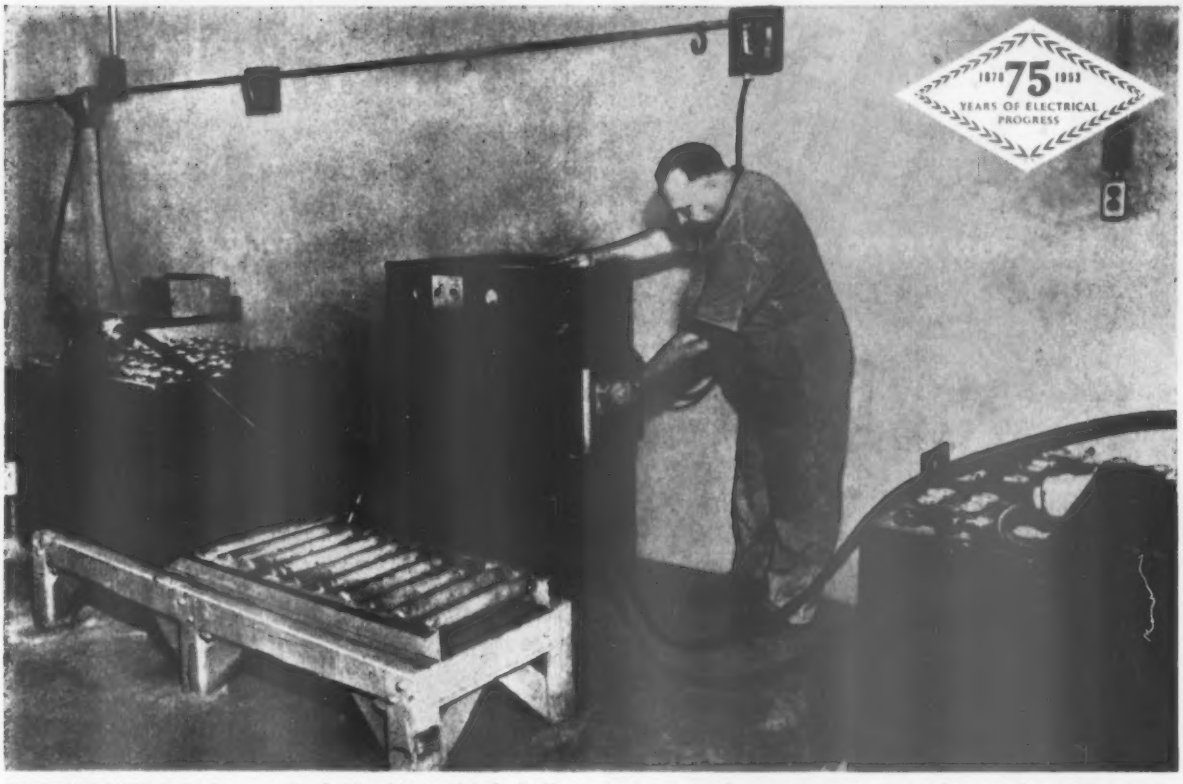
ENGINEERING REPORTS:

ROTATING-TYPE chargers made by General Electric are adaptable to driver-ride truck batteries of both lead-acid type (6 to 24 cells) and nickel-iron-alkaline type (10 to 32 cells). Lightweight and compact, they can be mounted on balconies or other supporting surfaces (as with this group of eleven in a San Francisco plant), or stacked in tiers to save space.

Correct charger application helps

FULLY AUTOMATIC rotating-type G-E chargers are easy to operate. Plug in charger, set timer, and automatic control does the rest, shutting down unit when battery is fully charged.

VERSATILE rectifier-type G-E chargers can be adjusted for charging different types of truck batteries, and are fully automatic. Both high and low rates can be adjusted over wide ranges.



RECTIFIER-TYPE G-E chargers for lead-acid or nickel-alkaline batteries in driver-ride or driver-lead trucks need no special foundation and are easy to install. Since they occupy very little space, they can even be located in truck working areas, as in this New York food plant. This permits "on-the-spot" charging, lets you get more working time from your trucks.

maintain production continuity

Selection of the right G-E charger—for the correct plant location—assures top performance of your electric trucks

When batteries are properly charged, your electric trucks keep rolling, materials move fast, and production goes up. But proper charging means selecting the right charging equipment for *your* particular needs. That choice is made easier by General Electric's complete line of rotating and rectifier chargers—backed by skilled G-E application help.

Whether your chargers are to be centrally grouped or spotted throughout your plant—for large fleet needs or smaller operations—the equipment you get from G.E. (1) does the job economically and dependably, (2) is the right equipment for your needs, (3) is more efficiently used because of the recommendations that accompany it. When you plan for new charging equipment, be sure to contact your G-E Apparatus Sales Representative. General Electric Company, Schenectady 5, N. Y. 669-6

FREE MANUAL ON MATERIALS HANDLING

For your copy of the manual "Materials Handling," part of G.E.'s "More Power to America" program, write on your letterhead for Bulletin GEA-4962. To see the accompanying film, ask your equipment supplier or G-E Apparatus Sales representative.

Engineered Electrical Systems for Materials Handling

Conveyor drives • Crane drives • Hoist drives • Industrial truck drives and battery chargers

GENERAL ELECTRIC

CABLE-LINK

CABLE CONVEYOR SYSTEMS

will

SOLVE YOUR OVERHEAD MATERIALS HANDLING PROBLEMS QUICKLY AND ECONOMICALLY

The Cable-Link organization through sound and proven engineering has succeeded in developing the extremely efficient and economically priced C-L Cable Conveyor Systems.

Today, in almost all branches of light and heavy industry, C-L Conveyors are demonstrating their superiority over all previously known methods—regardless of capacity, length, or materials handled.

DEPENDABILITY IN STRENGTH!

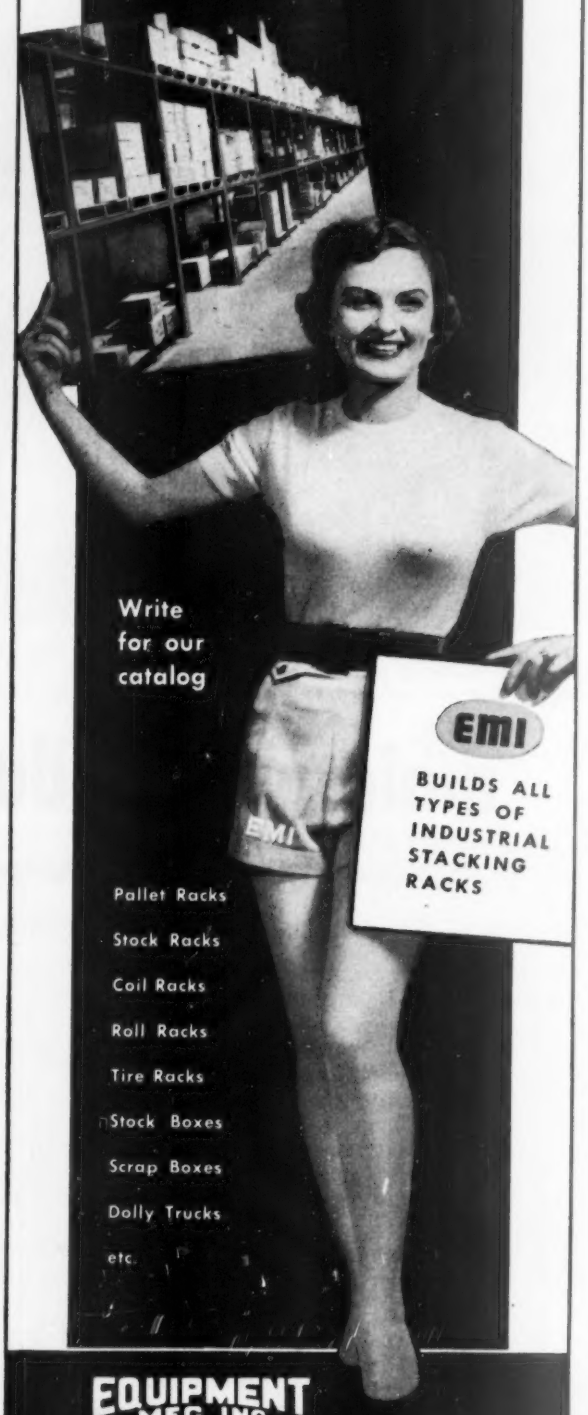
This is a "CABLE-LINK" with Swedge-Buttoned Ends!

MADE OF STRONG, DURABLE, PRE-FORMED PLOW STEEL

CABLE-LINK CORPORATION

20175 JOHN R • DETROIIT 3, MICH

Well Stacked!



EQUIPMENT MFG. INC.

21561 Hoover Road, Detroit 5, Michigan

BOOTH 1005, MATERIALS HANDLING SHOW, PHILADELPHIA, MAY 18

ARO

1000 pound AIR HOIST

for **SPEED...**

Lift rate...
over 40 ft. per minute!

SIZE...

Overall length 10⅛"
weighs only 27½ lbs.

SAFETY...

Betters all
safety requirements!

ACCESSORY EQUIPMENT

HOIST TROLLEY

HOSE TROLLEY

CHAIN BASKET

SEE AND OPERATE THIS HOIST
BOOTH 1839—MATERIALS HANDLING SHOW

The Aro Equipment Corporation, Bryan, Ohio
Offices in All Principal Cities
In Canada—Aro Equipment of Canada, Ltd., Toronto, Ont.

ARO **AIR HOIST**

Also . . . Air Tools . . . Lubricating Equipment . . . Aircraft Products . . . Grease Fittings

The Aro Equipment Corporation, Bryan, Ohio

Please send full details on the new ARO Air Hoist, without obligation.

Name _____

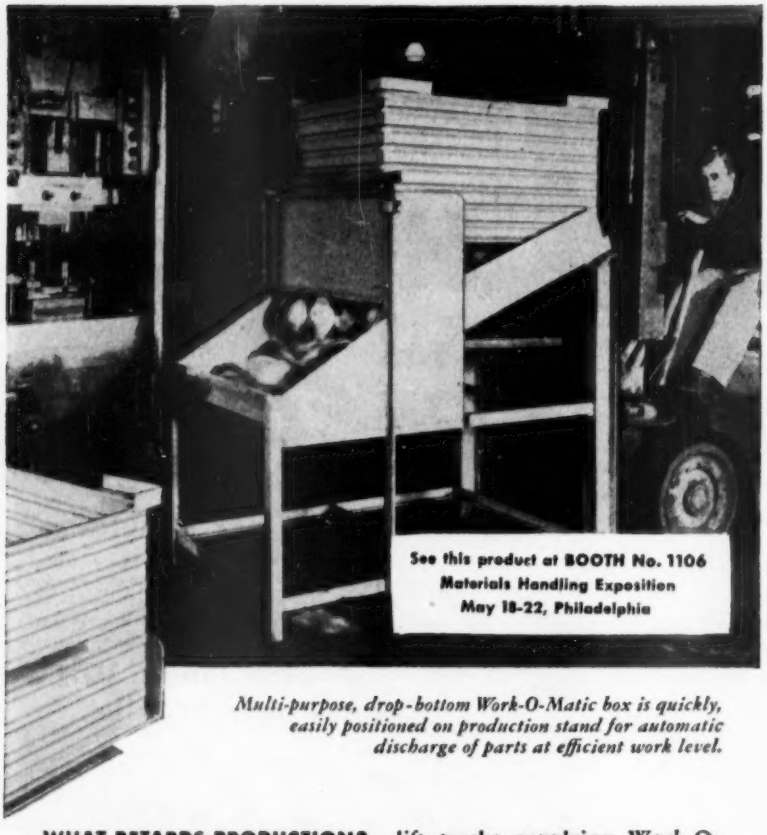
Company _____

Street _____

City _____ State _____

B-323

PRODUCTION GOES FASTER with cost-cutting WORK-O-MATICS*!



Multi-purpose, drop-bottom Work-O-Matic box is quickly, easily positioned on production stand for automatic discharge of parts at efficient work level.

WHAT RETARDS PRODUCTION? —waste motion at machines, tiring stoop-bend-stretch methods, needless repetitive handling of parts, supply delays, etc. Look how the WORK-O-MATIC system cancels these losses . . .

With the Work-O-Matic, parts flow to the machine operator at efficient work-level height. The stand's front reservoir tray avoids "production lag" while empty boxes are being replaced. And lift trucks supplying Work-O-Matic stations can schedule deliveries to maximum efficiency.

But get *all* the facts . . . on increased storage capacity . . . mechanical dumping . . . better tiering . . . simplified aisle handling . . . and production increases of 50% and more! Write to The Union Metal Manufacturing Company, Canton 5, Ohio, for Folder MH-809 and T & M Studies.

*Patent No. 2,445,038. Other patents pending.

UNION METAL
Materials Handling Equipment

Free NEW CATALOGS

MATERIALS HANDLING

OTHER SECTIONS:

Building & Grounds Page B-40
Plant Services B-108
Electrical Distribution . B-266

202 Fork Trucks This 38-page catalog covers a full line of industrial trucks and hoists. Construction features and applications. Catalog No. P602. Yale & Towne Mfg. Co.

203 Hand Trucks You get specifications, applications, and illustrations for each of 6 models in this folder. Construction details, too. 4 pages. Bulletin 789-2. Standard Pressed Steel Co.

204 Walkie-Type Trucks Application and selection data in this 6-page folder. Capacity charts and illustrations, section on special-purpose trucks. The Moto-Truc Co.

205 Industrial Trucks, Tractors Describes trackless train, fork truck-pallet, and platform-lift methods of materials handling. Illustrates maker's equipment in each category. Bulletin 300. 42 pages. Mercury Mfg. Co.

206 Industrial Trucks A 12-page catalog (No. B-167) describes components and gives maintenance data. Specs and illustrations for each model. Elwell-Parker Electric Co.

207 Industrial Trucks "Basic Facts About Materials Handling" graphically shows

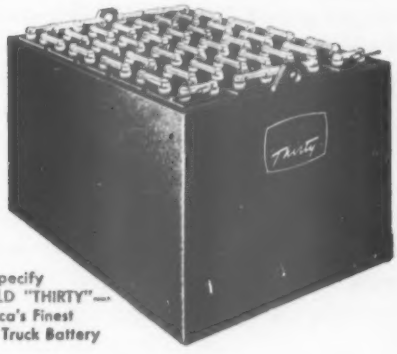
To get these catalogs, circle number on reader's service postcard next to back cover.

UNMATCHED DEPENDABILITY

THANKS TO BATTERY POWER!

You can always depend on battery-powered industrial trucks to work all day without letdown. They have fewer moving parts, fewer friction surfaces to cause downtime . . . have in-service records that can't be matched! In addition they are fool-proof, handle, lift and maneuver faster, run silent and fume-free. Keep them moving with *dependable* Gould battery power.

Visit us at the National Materials Handling Exposition, Convention Hall, Philadelphia, Booths 335-337.



Specify
THE GOULD "THIRTY"—
America's Finest
Industrial Truck Battery

GOULD INDUSTRIAL BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

©Gould-National Batteries, Inc.

NOW—A NEW "ZIP"

WITH ROPE CONTROL*

ONLY $199.50

Now, for the first time, the famous Zip-Lift Electric Hoist at the amazing low price of *only* $199.50. It's a genuine Zip-Lift . . . with all the solid quality you expect from P&H. The same preferred P&H engineering! The same fine P&H construction! *And* — a unique, new rope control designed for fast "one-hand" hand operation. It's the big bargain today in small hoists. It's ready to work and save for you!

The Zip-Lift frees skilled hands for more productive work. No more valuable time lost hustling heavy loads manually! P&H "Thru-the-Air" handling makes production costs tumble.

Call your nearest P&H dealer and have him tell you about the latest handling ideas. He'll show you where and how the Zip-Lift will cut costs for you!

Users! Dealers!

Visit the P&H Exhibit at the Materials Handling Show in Philadelphia Space 1509—1513—1515, May 18-22.

See the new P&H Zip-Lift in action! It's the high quality, low-cost *electric wire rope hoist* you've been waiting for!

PUSH BUTTON CONTROL ALSO AVAILABLE AS OPTIONAL EQUIPMENT. *

P&H HOIST DIVISION
HARNISCHFEGER CORPORATION
Milwaukee 46, Wisconsin

IMPORTANT NEW *Free* CATALOGS

Begins on page B-324

the many ways that materials handling equipment can cut costs for you. 24 pages. Clark Equipment Co.

208 Industrial Trucks
Catalog No. 1102 brings you several models of maker's battery-powered trucks. Describes operation and maintenance, gives specs on the complete line. 20 pages. Market Forge Co.

209 Fork Truck
Specs, dimensions, and applications in this folder on a new model truck. Describes aisle-space savings you can make. Bulletin No. 90-156. Lewis-Shepard Products, Inc.

210 Bulk Handling Truck
This 16-page catalog tells where you can use the truck and how. Specifications and operating features. Form No. 230. The Frank G. Hough Co.

211 Industrial Truck
Folder describes an industrial truck you can use three ways: as a power wheelbarrow, a fork truck, and a platform truck. Specs and applications. Kwik-Mix.

212 Trucks and Casters
Three catalogs: 4-pager describes steel-framed platform and hand trucks; 4-pager on casters; 2-pager on platform and bag trucks. Specifications. Illustrations. Fairbanks Co.

213 Batteries
Outlines the unit-load method of handling, points out characteristics on a line of storage batteries. Specs, operating data. 28 pages. Edison Storage Battery Div., Thomas A. Edison, Inc.

214 Batteries
Here's a 6-page folder that gives specs and construction details. Application information. Bowers Battery & Spark Plug Co.

215 Battery Chargers
Three bulletins describe single-circuit motor-generator battery-charger equipment. Features illustrated, maintenance described. Specification charts. The Electric Products Co.

216 Battery Chargers
A 4-pager on a line of battery charges. Describes each model, illustrates components. Section on special motors, motor generator sets, and control equipment. 4 pages. The Hertner Electric Co.

217 Battery Truck Drives
Here's a 4-page bulletin on battery truck motors. Tells how they can help cut your handling costs. Gives operating features, specs, and illustrations of components. Catalog No. GEA-5630. General Electric Co.

218 Wheels & Casters
You learn how to select and use maker's industrial wheels and casters in this 42-pager. Specs, features, and operating do's and don't's. Divine Bros. Co.

219 Wheels & Casters
This 60-page catalog (No. 153) brings you specs, dimensions, and illustrations on wheels and casters, conveyor equipment, trailer leveling jacks, and retractable casters. Saginaw Products Corp.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

To get these catalogs, circle number on reader's service postcard next to back cover.

HANDLE IT
"THRU-THE-AIR"
with P&H ZIP-LIFT
AT STILL
LOWER COST!
Now Have These Advantages

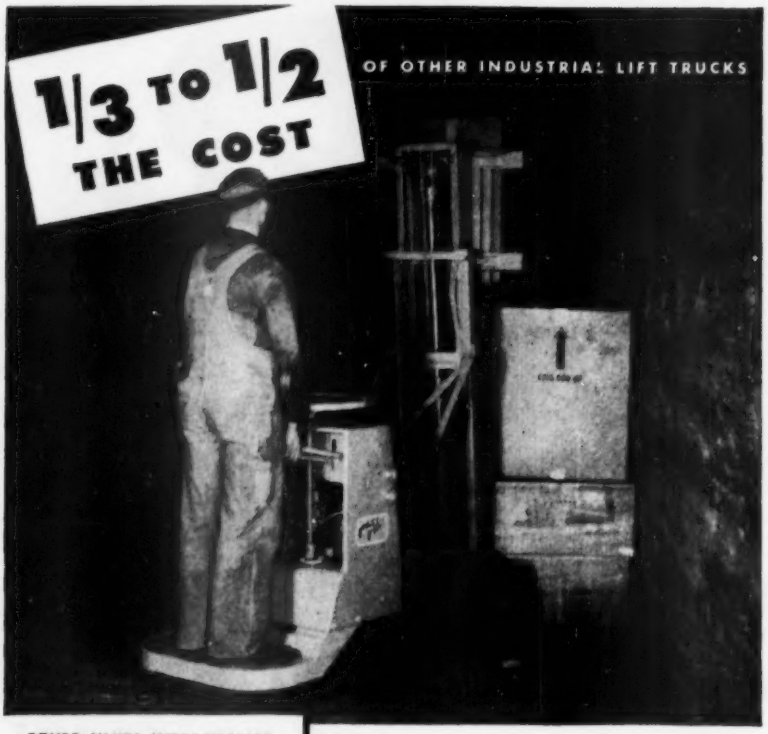
Wire Rope Hoisting!
No troublesome chains, no hidden weaknesses, no dangling loops to tangle or get in the way. Free, easy handling and wider range of side pull with wire rope hoisting.

25% Overload Capacity!
This extra safety factor reveals more fine P&H engineering — and overload margin up to one-fourth above rated capacity during intermittent usage.

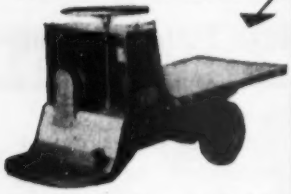
Extra Quality Features!
Double brakes for greater safety — Fully enclosed construction — Lasting drive mechanism — Mechanism operating in oil for longer life — Improved easy-working load block.

Call your P&H Dealer

P&H HOIST DIVISION
HARNISCHFEGER CORPORATION
Milwaukee 46, Wisconsin



OTHER UNITS INTERCHANGEABLE WITH FORK LIFT



CARRIES ¾-TON on sturdy 32 in. x 4 ft. platform.

HAULS 10 CU. FT. (struck) in big gravity-dump hopper.

CLEARS SNOW, does leveling with 5-foot scraper blade.

LIFTS ½ TON to 5-foot height At only one-third to half the price of other industrial lift trucks, you can now get a Kwik-Mix Moto-Bug Fork Lift with 1,000-pound capacity (at 15" load center) and 5-foot lifting height.

Power-driven hydraulic lift raises and lowers load. Forks are 20-in. long (30-in. optional) . . . and adjustable from 6 to 32-in. width for pallets, boxes, barrels, drums, crates.

Weighs only 1500 pounds . . . This light-weight Fork Lift works over old warehouse floors, in elevators, on light ramps where heavier trucks can't safely travel. Fork Lift mast telescopes for low head-room.

Short turning radius of 61 inches gives plenty of maneuverability inside boxcars, on trucks, in crowded production areas. 32-inch width easily clears narrow aisles and doors. There's instant power forward and reverse for fast, effortless backing and spotting.

Standard 6 h.p. gas engine, heavy-duty transmission and automotive-type differential all assure steady performance. See for yourself how Moto-Bug Fork Lift quickly pays for itself in extra production and man-hours saved. Call your Kwik-Mix distributor . . . or write us.

Mail to: KWIK-MIX CO., Port Washington, Wis.
Please send bulletin and price information on Moto-Bug Fork Lift
NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY, STATE _____ KM290FAC

KWIK-MIX Moto-Bug FORK LIFT
Koehring Subsidiary

Free NEW CATALOGS

Begins on page B-324

220 Tote Boxes You learn how you can use a multi-purpose tote box that nests for easy stacking. Illustrations of the equipment in use. descriptions of models. 4 pages. The Chas. W. Doepke Mfg. Co., Inc.

221 Skids, Pallets, Boxes A complete line of handling equipment in this 18-page catalog. Tells where to use each type. Specs, installation photos. Fab-Weld Corp.

222 Containers Here's an 8-page bulletin on industrial containers. Illustrations, specs, features, and applications. G. B. Lewis Co.

223 Freight Elevators Outlines advantages of using elevators powered by oil under hydraulic pressure. Tells how it works, how it's made, how it's installed. 20 pages. Catalog No. RE-305. Rotary Lift Co.

224 Dockboards Specs and features on magnesium dockboards in this 6-page folder. Illustrates applications. Magnesium Co. of America.

225 Dockboards Magnesium dockboards and board-ramp combinations are subjects of this folder. Illustrates features. Magline, Inc.

226 Transfer Bridges Tells how plant traffic can take a short cut across railroad tracks. Photographs illustrate several types of installations. 4 pages. Folder No. RE-700. Rotary Lift Co.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

Homocord Conveyor Belt—More use per dollar

Homocord Conveyo *re use per dollar*

Homocord C *er dollar*

Homo *r dollar*

Homoco *e per dollar*

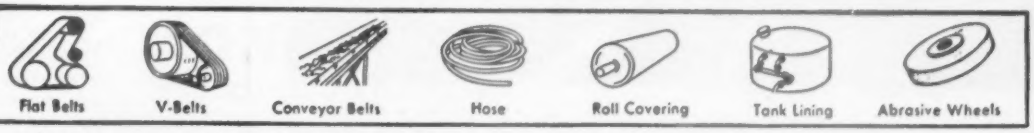
Homocord Conve *e use per dollar*

CUSHIONED THROUGH AND THROUGH . . . To take the impact of heavy loading. That's why you get more ton-miles of service out of Homocord Conveyor Belt. This resilience withstands the abrasion and gouging of jagged rock, coal and ore. Its flexibility makes it a naturally deep troughing belt that trains easily on the idlers . . . able to haul heaping loads without edge-wear or spilling. Another R/M Conveyor Belt, Ray-Man "F", is designed for underground mining where pulleys are small and great flexibility and tear resistance are needed. Both of these R/M belts give you long life on the job, MORE USE PER DOLLAR. Ask the R/M distributor for Bulletins 6906 and 6915. R/M field engineers back him up, to give you MORE USE PER DOLLAR—not only in conveyor belts, but in hose, transmission, and V-belts.

R/M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

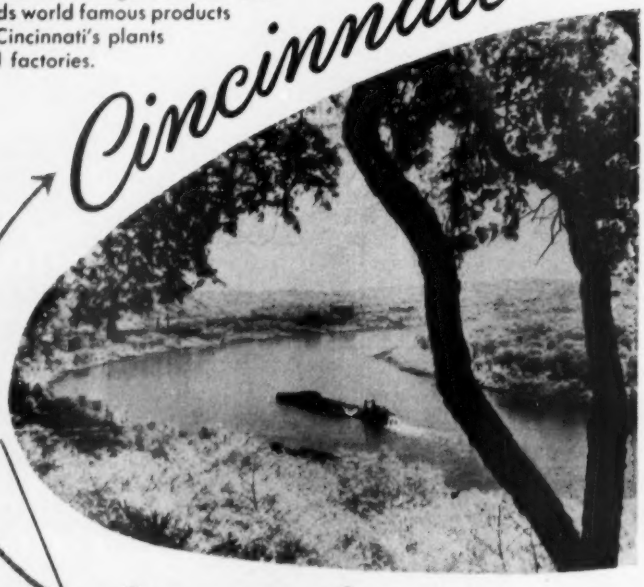
RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Teflon Products • Packings • Sintered Metal Parts • Bowling Balls

"STEAMBOAT 'round the bend!" comes the cry of the Ohio River dock hands. Then nuzzling up to the busy wharf, barge after barge unloads its cargo of coal and loads world famous products of Cincinnati's plants and factories.

Cincinnati



home of

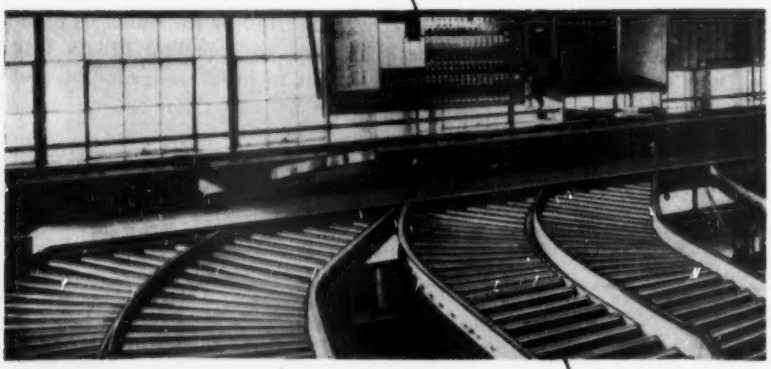
ALVEY-FERGUSON

the original-Since 1901

engineered conveying systems

YOU can see the superiority of A-F Engineering in this portion of an A-F plant-wide completely-coordinated conveying system operated automatically from a central station by an electrically controlled panel.

Visit our Booth No. 1455
Materials Handling Exposition
Philadelphia, May 18-22



A-F **THE ALVEY-FERGUSON COMPANY**
135 Disney St., Cincinnati 9, Ohio
OFFICES OR REPRESENTATIVES IN PRINCIPAL CITIES

For a discussion of latest efficient handling methods write today.

Free NEW CATALOGS

Begins on page B-324

227 Conveyors
Tells how you can use standard conveyor units to meet changing conditions in the field. Specs and details on belt, horizontal belt, belt boosters, live-roll conveyors, others. Logan Co.

228 Conveyors
Just name your application and this catalog tells you how to select maker's equipment to do the job. Production line photos. Illustrations and description on parts. 16 pages Bulletin No. 68. Standard Conveyor Co.

229 Conveyors
Catalog Nos. 400 and 60 illustrate the many applications for trolley, roller, live-roller, chain, bridge, and bulk material conveyors. Specs, engineering drawings. 40 pages in all. E. W. Buschman Co., Inc.

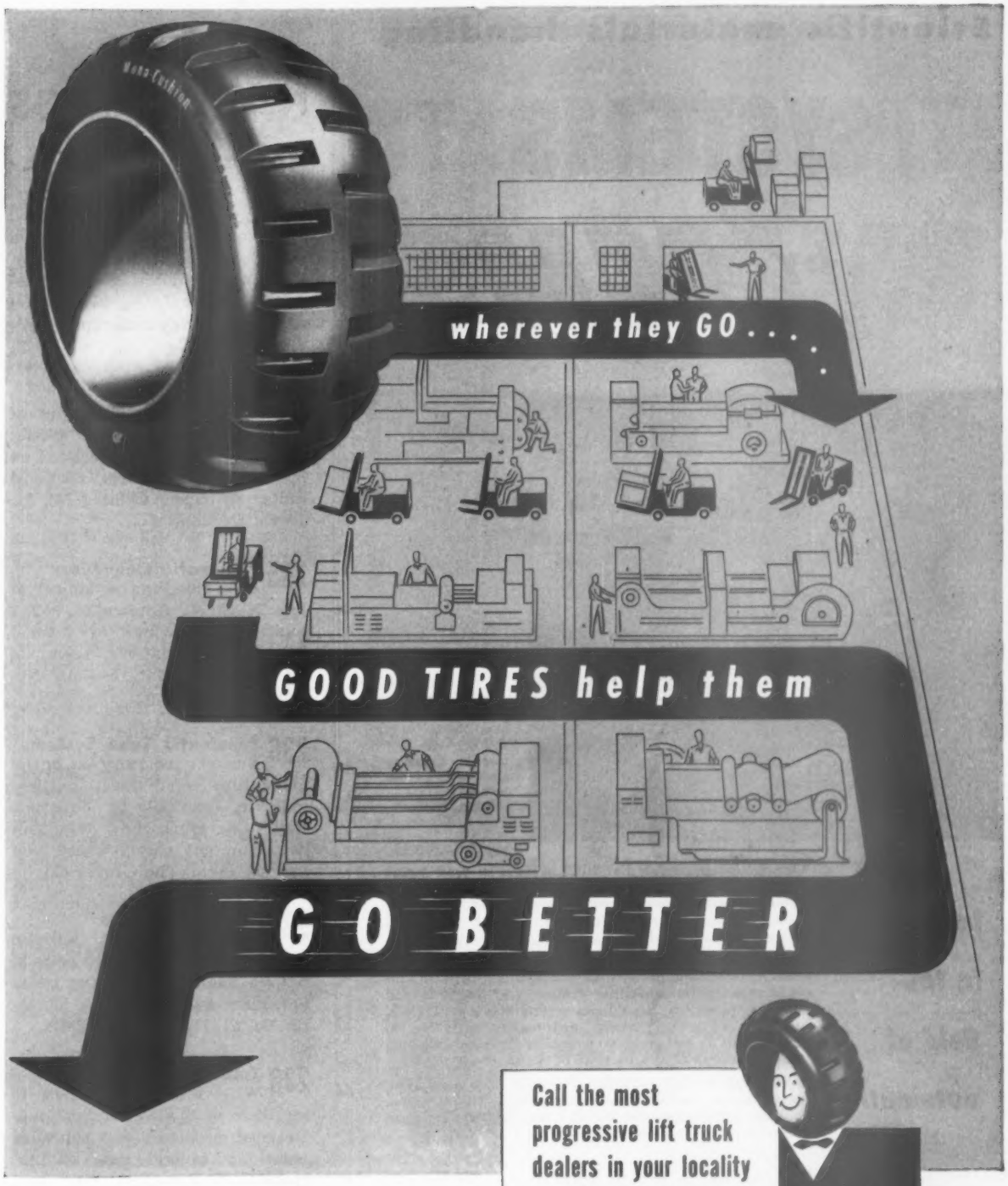
230 Conveyors
Group of catalogs on overhead controller, oscillating, bulk handling, and screw conveyors. Selection, application, and layout data. More than 100 pages in all. Link-Belt Co.

231 Conveyors
Gravity wheel and power belt conveyors in this 12-pager. Photos of each model, specs, and application data. Engineering drawings describe installation. Speedways Conveyors, Inc.

232 Conveyors
Unitized belt conveyors are illustrated and described in this folder. Details in each section tell how you can adapt to your needs. Conveyor Specialty Co.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.



Call the most progressive lift truck dealers in your locality or write direct to us.

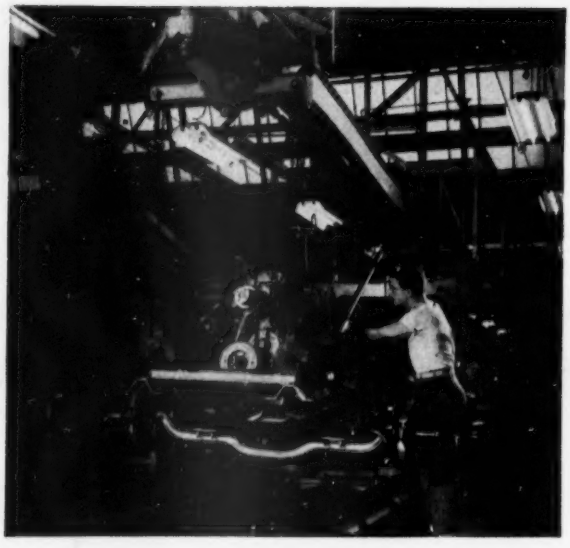
THE
MONARCH
RUBBER COMPANY
HARTVILLE, OHIO

SPECIALISTS IN INDUSTRIAL SOLID TIRES AND MOLDED MECHANICAL RUBBER GOODS

Scientific materials handling

SYSTEMS

by MHS



Truck chassis leaves the chassis assembly line, picked up by overhead Monoveyor for delivery to final assembly line in an MHS designed and built materials handling system.

Leader in the field of automation

The correct materials handling system in your plant can bring you real advantages and savings. Savings in labor costs, savings in inventory and warehousing, savings through greater productivity of machines, savings because of better product.

Mechanical Handling Systems, with 34 years of experience and demonstrated ability, can develop and build exactly the handling system you need. It will embody practical, imaginative engineering. It will utilize automation where automatic handling is practicable. It will give you a system for more efficient, more economical production of your product.

Whether you are building a new plant, modernizing your present facilities, or adding new departments, call the MHS engineer for the most expert help on scientific materials handling.

Mechanical Handling Systems, Inc.

4608 NANCY AVENUE, DETROIT 12, MICH.

Offices in Principal Cities

In Canada: **Canadian Mechanical Handling Systems, Ltd., Toronto**

Free NEW CATALOGS

Begins on page B-324

233 Conveyors Power and free conveyors in this 80-page catalog (No. 52). Describes operation of each model, specs, features, installation drawings, and photographs. Jervis B. Webb Co.

234 Conveyors Describes several types of equipment for solving special conveying problems. Sections on pusher-dog assemblies, standard units. 90 pages. Catalog No. 51. Jervis B. Webb Co.

235 Pneumatic Conveyors Bulk handling is subject of this 24-pager. Application chart, schematic drawings of several types of installations, specs on maker's equipment. Bulletin No. 529. Dracco Corp.

236 Pneumatic Tube Systems You get the story on pneumatic tube communications systems in this pair of bulletins. How they work, how they can help you cut costs, where you can use them. The Grover Co.

237 Oven Conveyors Here's a 12-page bulletin on a conveying system to be used with a baking and drying oven. Selection, operating data. Bulletin No. 51. Despatch Oven Co.

238 Tubular Conveyors What they are and how to use them in this 28-page catalog. Detailed problems and solutions point up several case studies. Hapman-Dutton Co.

239 Idlers, Conveyor Systems Bulletins describe operation and maintenance of belt conveyor

To get these catalogs, circle number on reader's service postcard next to back cover.

Free NEW CATALOGS

Begins on page B-324

idlers and belt conveyor systems. Specs and design features. 22 pages in all. Transall, Inc.

240 Belt Conveyor Carriers Bulletin No. 2-C gives application data and selection information. Specs, dimensions, installation photos. 18 pp. Stephens-Adamson Mfg. Co.

241 Belting Conveyor and elevator belting is subject of this 36-page catalog (No. M-0786). Application, engineering, and installation information. U. S. Rubber Co.

242 Packaging Tape You learn how you can use maker's tape and dispensers in the 24-page packaging guide. Specs and applications for each item. Minnesota Mining & Mfg. Co.

243 Packaging Tape This 20-page catalog describes reinforced gummed paper and shows how many companies are using it in packaging. Section on dispensers. Mid-States Gummed Paper Co.

244 Steel Strapping Points out savings you can get with maker's equipment, shows how. Specs and features on strapping and seals, other equipment. 30 pages. Acme steel Products Div., Acme Steel Co.

245 Steel Strapping Describes cost cutting possible in using a line of steel strapping and strapping equipment. Illustrated application section. 40 pages. Catalog No. 15 Signode Steel Strapping Co.

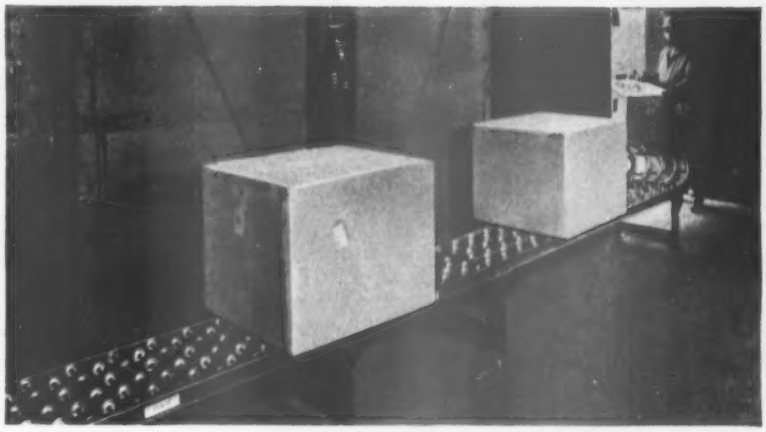
Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

High quality conveyor

STANDARD UNITS

by MHS



MHS Wheelveyor, in standard sections and curves, speeds loading and unloading operations of bulky merchandise.

Wheelveyors

Transveyors

Rollerveyors

Liftveyors

Here's the MHS line of standard conveyors to handle the thousand and one jobs of materials handling in warehouses, stockrooms, shipping docks, stores, trucks and trailers.

Engineering, materials, and workmanship on these fine conveyor units are the same that have brought MHS to the top of the heap in engineered conveyor systems. MHS standard units will run smoothly, carry goods easily and safely, and will serve you well for years and years.

For wheel and roller conveyors, power belt and live roller conveyors, choose MHS. Available in wide range of sizes and capacities, for portable or fixed operation.

Send for FREE booklet!

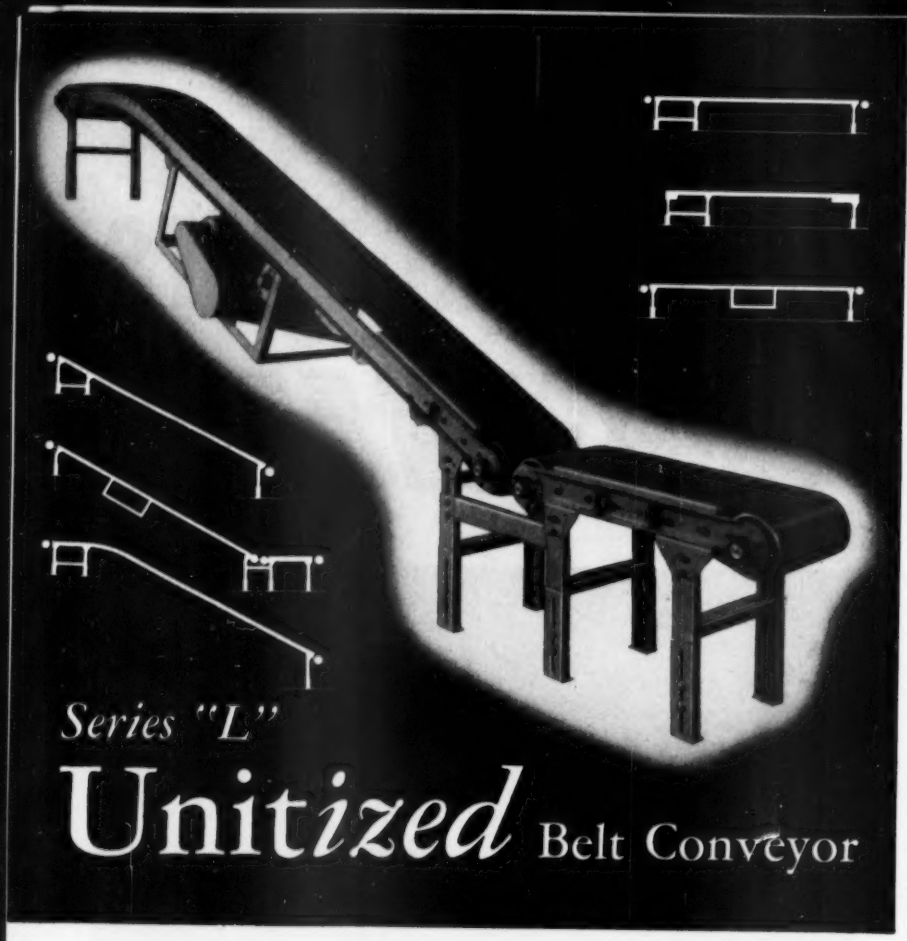
Contains illustrations, descriptions, data, on MHS standard unit conveyors. Get your FREE copy.

Mechanical Handling Systems, Inc.

4608 NANCY AVENUE, DETROIT 12, MICH.

Offices in Principal Cities

***In Canada:* Canadian Mechanical Handling Systems, Ltd., Toronto**



Series "L"

Unitized Belt Conveyor

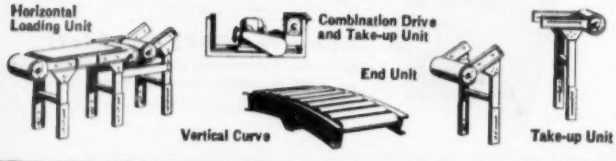
Here are just a few of the many ways you can easily engineer your own belt conveyor!

Simply choose from standard stock units the Series "L" take-ups, drives and intermediate sections to meet your job requirements.

A variety of widths, lengths, inclines, load ratings, etc., gives you the benefits of CUSTOM DESIGN . . . plus ECONOMY you expect only in *stock* conveyors.

See the Series "L" at the N.M.H. Show or write for facts.

THESE AND OTHER UNITS AVAILABLE FROM STOCK



- Gravity Conveyors
- Press Conveyors
- Slat Conveyors
- Unipac Handlers (Portable Pilers)
- "Unitable" Belt Conveyors
- "Unitrough" Belt Conveyors
- Reciprocating Lifts
- Complete Package Handling Systems

Conveyor Specialty COMPANY, INC.

32 Newport Ave., North Quincy 71, Mass.

Free NEW CATALOGS

Begins on page B-324

246 Steel Strapping
"Blue Book of Packaging" gives specs on maker's steel strapping and shows how to put it to use in many ways. Covers strapping machines, other accessories. 24 pages. Gerrard Steel Strapping Div., U. S. Steel Corp.

247 Shipping Containers
A 12-page catalog tells how engineered containers can answer your military packaging needs. Photographs illustrate what types of boxes are available. General Box Co.

248 Sling Chains
Tells how to select what you need. Specifications and applications for each type of chain. Section on definitions. 32 pages. Catalog No. DH-314. American Chain Div., American Chain & Cable Co., Inc.

249 Slings
This 48-page sling handbook tells you how to design a sling for any type and size load. Complete directions on making various splices in braided wire fabric. Union Wire Rope Corp.

250 Slings
An 8-page catalog telling how to assemble slings to meet specific needs. Selection information, design data. Catalog No. S-2. American Chain & Cable Co., Inc., Rope Sling Dept.

251 Hoists
A collection of bulletins on hoists and maintenance tools. Engineering drawings, specs, application data. Product illustrations. 50 pages in all. Coffing Hoist Co.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

Do your Lift Truck Engines give you these problems?

- Exhaust smoking
- Oil screen plugging
- Crankcase and valve chamber sludge
- Sticking valves and plugged oil rings
- Rapid wear of critical moving parts

"Read about the oil that laughs at 'em!"

THE engines that do our modern moving and shifting chores around the plant take more of a beating than meets the eye. Lift trucks are a good example. They idle much of the time . . . start and stop and work and loaf, week in and week out. That's the service that brings on the complaints listed.

Shell has met this problem with a special lubricating oil that literally clears these evils out of the picture. Shell Rimula Oil takes care of any of them . . . or any combination of them.

This is the product with a service record adding up to hundreds of thousands of miles . . . in delivery truck operation; in diesel and gasoline engines, both automotive and stationary; on construction projects; in farm machinery; in numerous plants.

Shell Rimula Oil is setting new standards of performance in low temperature—intermittent engine operation. Try it and see!

For further information on the cost-cutting advantages of Shell Rimula Oil, write Shell Oil Company, 50 West 50th St., New York 20, N. Y. —or, 100 Bush St., San Francisco 6, California.

SHELL RIMULA OIL

SHELL

F.O.B. MADISON, WISCONSIN...

packing time cut 60%
materials cost cut 17%
shipping weight cut 9%

With General Engineered Containers

Wherever these giant cylindrical pressure sterilizers are going, it costs less to ship them. General container engineering cut material cost $2.00, saved 70 minutes packing time and reduced shipping weight 42 lbs. on this hard-to-pack item . . . and this is only 1 of 12 cost-cutting containers we have helped to create for Ohio Chemical and Surgical Equipment (a Division of Air Reduction Company, Inc.) since 1949.

Whatever your packaging problem, military or civilian, General Box Company's two fine packaging laboratories and trained packaging experts stand ready to help you solve it. Find out how *you* can cut costs. Write for complete details.

Find out how other manufacturers are cutting container costs. Write for your free copy of "The General Box."

General ★★★★★ **BOX COMPANY**
1807 Miner St.,
Des Plaines, Ill.

Factories: **Cincinnati, Denville, N. J., Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, Prescott, Ark., Sheboygan, Winchendon, Mass., General Box Company of Mississippi, Meridian, Miss., Continental Box Company, Inc., Houston.**

ENGINEERED SHIPPING CONTAINERS FOR EVERY SHIPPING NEED
• Wirebound Crates and Boxes • Generalift Pallet Boxes • Generalite Beverage Cases
• Cleated Corrugated and Watkins-Type Boxes • All-Bound Boxes • Corrugated Boxes

Free NEW CATALOGS

Begins on page B-324

252 Hoists Plenty of application tips in this 12-pager. Check charts help you select. Construction details included. Bulletin No. 1567. Yale & Towne Mfg. Co.

253 Hoists Catalog No. 127 describes a line of hoists to handle loads of 250 to 40,000 pounds. Engineering and operating data, photos of installations. 44 pages. Shepard Niles Crane & Hoist Corp.

254 Hoists Each model is illustrated and described fully in this 8-page bulletin. Selection, application, and how-it-works data. The Harrington Co.

255 Hoists Electric and hand hoists are subjects of this 32-pager. Specs and illustrations show what's available. Covers trolley, jib cranes, too. Applications, construction features, and cut-away drawings. Wright Hoist Div., American Chain & Cable Co., Inc.

256 Hoists A group of six bulletins on maker's wide range of hoists. You'll find photos, cutaway drawings, specifications, other data. 34 pages in all. Hoist & Crane Div., Robbins & Myers, Inc.

257 Tramrail Equipment Engineering and application data in this 12-pager. Describes design of systems, tramrail electrification. Specs and operating data. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

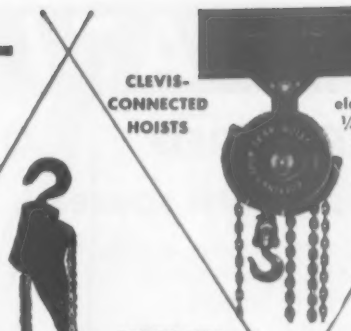
Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

In hand-operated hoists—
It's Coffing

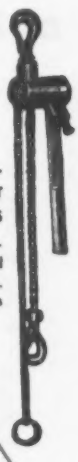
83 SIZES AND MODELS TO FILL ALL YOUR NEEDS

CLEVIS-CONNECTED HOISTS
eleven models—¼- to 10-ton capacities



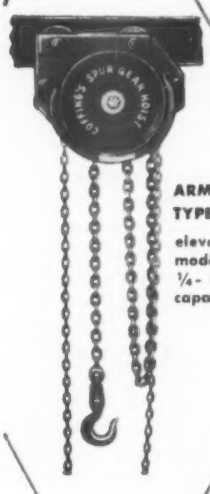
SAFETY-PULL RATCHET LEVER HOISTS
(roller chain)
ten models — 1,500- to 30,000-lb. capacities

MIGHTY-MIDGET PULLERS
two sizes— 500- and 1,000-lb. capacities



SPUR-GEAR HOISTS
(single chain)
eight models — ¼- to 2-ton capacities

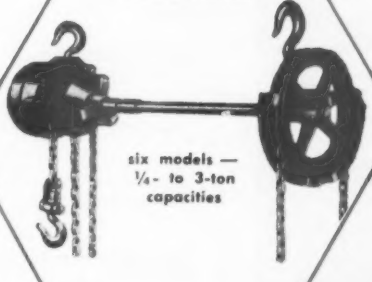
ARMY-TYPE HOISTS
eleven models — ¼- to 10-ton capacities



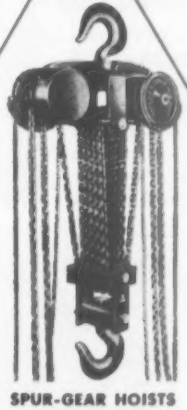
CHALLENGER LIGHTWEIGHT ALL-STEEL SPUR-GEAR HOISTS
three models — ½-, 1-, and 2-ton capacities

SAFETY-PULL RATCHET LEVER HOISTS
(coil chain)
two models — 1,500- and 3,000-lb. capacities

EXTENDED HAND-WHEEL HOISTS
six models — ¼- to 3-ton capacities



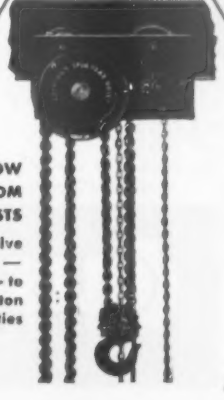
SPUR-GEAR HOISTS
(multiple chain)
fourteen models — 3- to 25-ton capacities



DIFFERENTIAL CHAIN HOISTS
two sizes — ½- and 1-ton capacities

HOIST-ALLS
two sizes — 1-, and 2-ton capacities

LOW HEADROOM HOISTS
twelve models — 1½- to 24-ton capacities



Ask for more information on the units you need from the most complete line of hand-operated hoists. Write Dept. M5.

COFFING HOIST COMPANY

See us in Booth 407 at the Materials Handling Show — Philadelphia, May 18 to 22.

VERSATILITY

in CRAMPED QUARTERS or in wide open spaces

Precision Control, Cantilever Boom and Economy with SAFETY goes with every

COLES CRANE

For greater efficiency in material handling operations, inside or outside of your plant consider what you can do with a COLES CRANE. The ability to swing the full 360° without loss of load lifting power . . . short wheel base . . . small turning circle . . . conventional steering in either direction . . . SAFE-LOAD cut-out and limit switches ALL COMBINE TO PROVE THAT THE COLES CRANE IS THE *IDEAL MATERIAL HANDLING* CRANE.

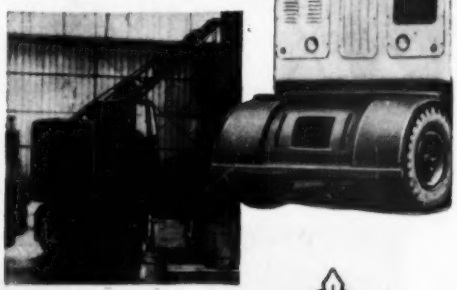
FROM 1¾ TO 23 TONS

There is a size Crane for every capacity with boom lengths and auxiliaries to meet your exacting requirements. Over 75 years of engineering experience makes the difference. Write today for complete data in our catalog or for the name of your nearest Dealer.

INDUSTRIES USING COLES MOBILE CRANES

- FOUNDRIES
- RAILROADS
- DOCKS
- STEEL WORKS
- CONSTRUCTION
- AUTOMOTIVE
- AIRCRAFT
- ERECTORS
- OIL REFINERIES
- PUBLIC UTILITIES
- BRIDGE BUILDERS
- QUARRIES
- WAREHOUSES
- LUMBER YARDS

and many others.



The name that carries weight in material handling!

COLES CRANES, INC., BOX 942 -Z, JOLIET, ILL.

COLES CRANES

Free NEW CATALOGS

Begins on page B-324

258 Overhead Handling
File folder shows how maker's equipment solved a dozen overhead handling problems. Describes automatic dispatch systems. More than 25 pages in all. The American MonoRail Co.

259 Scales
Catalog No. 11 helps you select from a full line of industrial weighing equipment. Sections on automatic weighing, electronic remote dials. 28 pages. Howe Scale Co.

260 Electronic Weighing
Describes details of operation, suggests applications. Included are construction features and engineering drawings. About 24 pages. Streeter-Amet Co.

261 Trucks and Tractors
Four 4-page folders covering speed trucks and tractors, bulk-handling truck, lightweight expediter, push cars, and trailers. Photos. Specifications. Kalamazoo Mfg. Co.

262 Tractors
Here's a 16-page catalog on industrial wheel and crawler tractors. Describes each model and its applications. Section on attachments. Catalog No. A-1018. The Oliver Corp.

263 Mobile Cranes
Application information and specifications on a line of mobile cranes. Gives construction details, tells how they work. 8 pages. Coles Cranes, Inc.

264 Floor Cranes
You'll find seven models in this 8-page, illustrated catalog.

Turn the page

To get these catalogs, circle number on reader's service postcard next to back cover.

When you're at the Show HERE'S SOMETHING YOU OUGHT TO LOOK INTO

5th NATIONAL MATERIALS HANDLING EXPOSITION
MAY 18-22, 1953
PHILADELPHIA

SEE the Nestier System for handling small parts faster, more efficiently than you've ever believed possible!

SEE the NesTier containers that do *every small parts handling job* from stockroom to loading dock – adapt perfectly to roller and overhead conveyors, skids and pallets – carry easily by hand!

SEE how NesTiers *nest* when empty to save space – *tier* when filled, with parts in each box visible, easily accessible!

SEE the NesTier baskets that *eliminate need for changing containers* when dipping, degreasing or cleaning!

SEE how NesTiers speed the flow of work, save time and labor at every point, *cut production costs!*

Visit the NesTier Booth

714

at the show and arrange for a factory demonstration. If you won't be at the show, write *now* and set a date. Let us prove NesTiers' efficiency — *in your plant!*

NESTIER
IT NESTS – IT TIERS

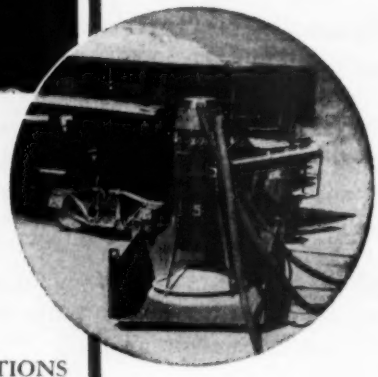
THE CHAS. WM. DOEPKE MFG. CO.
Metal Specialties Div.
ROSSMOYNE, OHIO

For the right answer to *every* small parts handling problem *SEE THE NESTIER SYSTEM!*

VACU-VEYOR

The conveyor that reaches anywhere

Vacu-Veyor moves into tough, tight spots to unload sand, grain, chemicals or any granular material. It provides pneumatic transport of material where only buckets and shovels could otherwise be used. In unloading tanks, bins, trucks, railroad cars and ships, one man can move up to 25,000 pounds of material per hour.



A FLEXIBLE VACUUM-PNEUMATIC SYSTEM

Vacu-Veyor uses a vacuum pickup nozzle and a flexible 3-inch hose to carry material to the unloader. If desired, a pressure hose can be used for discharge. The Vacu-Veyor can convey material as far as 100 to 200 feet horizontally and as high as 65 to 100 feet above its source.

TYPICAL LABOR SAVING APPLICATIONS

Removal of sand from sand blasted ship fuel tanks is one of the widely successful applications of the Vacu-Veyor. In a typical case, it used to be necessary to have 8 to 20 men shovel thousands of pounds of sand and remove it by "bucket brigade." Now, two men with a Vacu-Veyor remove this sand at a saving in labor cost sufficient to pay for the machine in a month.

Another practical application of the Vacu-Veyor is the moving of sand and other material from trucks into high feed hoppers.

VACU-BLAST CO., INC.

Please send specific detail information applying to the _____ *business.*
Firm _____
Address _____
Signed _____

Write for free booklet

Free NEW CATALOGS

Begins on page B-324

Gives you specifications, special features, and applications. Ruger Equipment, Inc.

265 Crane Reel A magnetic reel and tagline for boom and overhead cranes gets the spotlight in this 4-pager. Parts illustrations, installation photos. McCaffrey-Ruddock Tagline Corp.

266 Crane Cab Coolers Specs and application data on a line of crane cab coolers and conditioners. Shows how to select and install. Application data. 24 pages. Bulletin No. 1304. Dravo Corp.

267 Cranes Bulletin No. 70A covers truck-motor power cranes and derricks—1 to 10 tons capacity. Specs, capacities, illustrations of each model. Section on components. 8 pages. Silent Hoist & Crane Co.

268 Cranes, Winches This 30-page catalog covers cranes, blocks, winches, sheaves, derricks, and other equipment. Tells how each is used, describes operating features. American Hoist & Derrick Co.

269 Crane Here's the story on a 3-ton $\frac{3}{8}$-yd. crane excavator. Specs and applications. Charts and tables illustrate working ranges. 24 pages. Bulletin No. H-3-2. Bucyrus-Erie Co.

270 Shovels, Cranes This 20-pager covers shovels, cranes, hoes, draglines, and clamshells. Specs, application,

To get these catalogs, circle number on reader's service postcard next to back cover.

TOWMOTORS IN ACTION IN U. S. INDUSTRY

Stacking shingles to the rafters at Bird & Son, Inc., Chicago

How to boost your stock ...with the boss

You can cut materials handling time up to 50% and more all along the line—from receiving, clear through to shipping—with TOWMOTOR! Many users have more than doubled storage space. And only TOWMOTOR gives you TowmoTorque, the amazing new drive that eliminates clutching and gear-shifting. Plus effortless TOWMOTOR Power Steering! Plus revolutionary new Diesels with Cushioned Power! Plus time-tested Preventive Maintenance! Send for booklet describing TowmoTorque and Power Steering. TOWMOTOR CORPORATION, Div. 505, 1226 E. 152nd St., Cleveland, Ohio.

TOWMOTOR
THE ONE-MAN-GANG

FORK LIFT TRUCKS AND TRACTORS

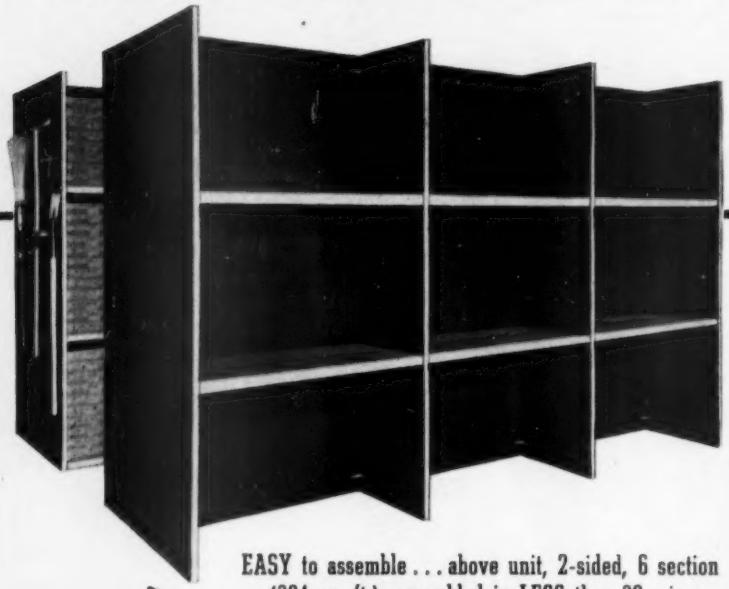
SINCE 1919

TOWMOTOR ENGINEERED FOR QUALITY PERFORMANCE

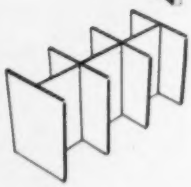
PEG-BOARD

Storage unit

NEW LOW-COST, STRONG INDUSTRIAL SHELVING • NOW AVAILABLE for IMMEDIATE DELIVERY

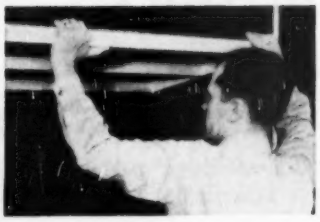


EASY to assemble . . . above unit, 2-sided, 6 section (384 cu. ft.), assembled in LESS than 30 min.



You can order "PEG-BOARD" industrial shelving units to fit your specific storage requirements. They are easy to assemble, yet carry a heavy load. Made of tough perforated hardboard mounted to sturdy cross-braced frames, the "PEG-BOARD" storage unit gives you economy, versatility and strength.

Shelves adjust to any height on 1" spacings. Shelves are inserted or adjusted in a matter of seconds with special self-locking hangers as illustrated below. No tools of any kind required for assembly.



Photos at right show how easily shelves are hung in this new unit. Shelves may be positioned at any height on upright sections. Each shelf is tough hardboard mounted to cross-braced frame. 1000 lb. load per shelf. The new "PEG-BOARD" low-cost units are available now . . . **no waiting** for delivery.

WRITE TODAY FOR PRICES

B. B. BUTLER MFG. CO., INC.

3151 Randolph Street • Bellwood, Illinois

Free NEW CATALOGS

Begins on page B-324

and capacity data. Catalog No. 37-45A. Bay City Shovels, Inc.

271 Fork Trucks This 4-page folder gives you specifications on a line of electric fork lift trucks. Bulletin No. 12. Wright-Hibbard Industrial Electric Truck Co.

272 Shovels, Cranes A 24-page catalog brings you a line of heavy equipment—shovels, cranes, draglines, pull-shovels. Installation photos, specs, capacity tables for each. Baldwin-Lima-Hamilton Corp., Construction Equipment Div.

273 Power Shovel Applications and construction features in this 28-pager on a heavy-duty shovel, 7¾-ton crane dragline, and pull shovel. Maintenance and operating data. Catalog No. K259. Koehring Co.

274 Tractors, Graders In this 28-page catalog you'll find selection and application information. Specs and illustrations. Section on special attachments. Tractor Div., Allis-Chalmers Mfg. Co.

275 Hoists & Derricks A group of booklets lists specifications, features, and applications. Capacity charts and construction details. 76 pages. Clyde Iron Works, Inc.

276 Railway Car Hauler Unit operates on both road and rail. Rubber wheels retract for switching and hauling. Applications, construction features, specs. Whiting Corp.

To get these catalogs, circle number on reader's service postcard next to back cover.

HYSTER PRESENTS...

Two Completely NEW Lift Trucks!

30" Free Lift
75" Turning Radius
38" Wide
82½" Collapsed
Height (with 9' lift)

The Ultimate in 4000-lb.
Lift Truck Maneuverability

THE UC-30

Capacity, 3000 lbs. (24" load center) Length, only 74⅝"

THE YC-40

Capacity, 4000 lbs. (at 24" load center) Length, only 78¾"

STREAMLINED AND FUNCTIONALLY DESIGNED FOR UNEQUALED PERFORMANCE IN CAR LOADING, WAREHOUSE AND ALL OTHER CLOSE-QUARTER OPERATIONS

Hyster now offers, in addition to the pneumatic-tired 4000-lb. YT-40 Lift Truck, a *new* lift truck in the 3000-4000-lb. class—*designed specifically for close-quarter operation!*

The new Hyster YC-40 is smaller than the pneumatic-tired YT-40 because it is *functionally* designed to more compact dimensions, utilizing smaller cushion tires. *The YC-40 is recommended for those applications where it is not necessary to use pneumatic tires.*

The new Hyster UC-30 is basically a YC-40 Lift Truck with a lighter counterweight, but with the same engine. Both incorporate advanced features not found in any other lift truck today! Call your Hyster dealer, or write for Catalog 1241 to:

HYSTER COMPANY

2936 N. E. Clackamas St. Portland 8, Oregon — 1036 Myers St. Danville, Illinois

Be Sure to Call HYSTER Before You Buy ANY Lift Truck!

Hyster 20 for 1000-2000-lb. work requiring pneumatic tires.

Hyster UC-30 for 3000-lb. close-quarter work. Cushion tires.

Hyster YT-40 for 4000-lb. work requiring pneumatic tires.

Hyster YC-40 for 4000-lb. work in close quarters. Cushion tires.

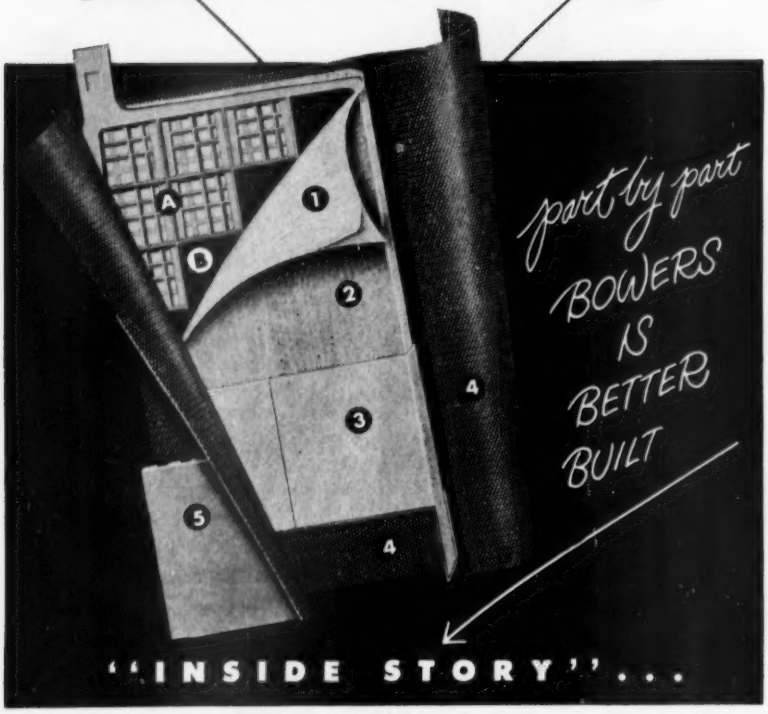
HYSTER

HYSTER COMPANY • FOUR FACTORIES: Portland, Oregon; Danville, Illinois; Peoria, Illinois; Nijmegen, The Netherlands

BOWERS

batteries really give you a

LIFT



"INSIDE STORY"...

These Construction Advantages provide EXTRA POWER—LONGER!

A. MODERN POWER GRID minimizes voltage drop at lug—exclusive with Bowers.

B. SPECIAL FORMULA ACTIVE MATERIAL—high porosity provides full power.

1. SLIVER ENVELOPS PLATE ON BOTH SIDES AND BOTTOM, deters plate shedding.

2. GLASS FIBER EXPANSION MAT bonded directly to sliver keeps elements tight.

3. FIBER GLASS RETAINING MAT holds entire mat structure firmly together.

4. PERFORATED HARD RUBBER RETAINER presses sliver and glass mats firmly against plate.

5. MICROPOROUS RUBBER SEPARATORS impervious to heat, acid and corrosion.

BOWERS FIVE (5) CLAD **BATTERIES**

for industrial trucks

built and backed by DEPENDABLE battery specialists

BOWERS BATTERY & SPARK PLUG CO., READING, PA.

FILM PROGRAM OF THE MONTH

MATERIALS HANDLING

Other film programs will be found on the following pages:

BUILDINGS & GROUNDS ..... page B- 56
PLANT SERVICES B-138
ELECTRICAL DISTRIBUTION B-276

"MATERIALS HANDLING IN RECEIVING, WAREHOUSING, AND SHIPPING" points out the advantages of using electric trucks, cranes, and conveyor belts in the handling of materials. Shows only machines powered by electricity. 21 minutes, color. Write:

General Electric Co., 1 River Road, Schenectady 5, N. Y.

"THE ONE-MAN GANG" demonstrates the use of the fork truck for the internal handling of materials. Stresses adaptability of this type of equipment. 35 minutes. Write:

Towmotor Corp., 1226 E. 152nd St., Cleveland 10.

"PAY LOADS PAY OFF" contrasts manual with mechanized materials handling in plants and warehouses. Gives you a time and motion study approach to the handling problem. 25 minutes. Write:

Institute of Visual Training, 40 E. 49th St., New York 17

"UP AND OVER" demonstrates the efficiency and uses of overhead materials handling equipment. Points out the flexibility of monorail conveyor systems. 19 minutes. Write:

American MonoRail Co., 13107 Athens Ave., Cleveland 7.

"CONVEYORS THAT PAY DIVIDENDS" shows a variety of ingenious conveyor systems that facilitate the handling of materials. A complete film on package handling showing some specific handling techniques. 30 minutes. Write:

Lamson Corp., Syracuse, N. Y.

Turn the page

WEBB

Conveyors

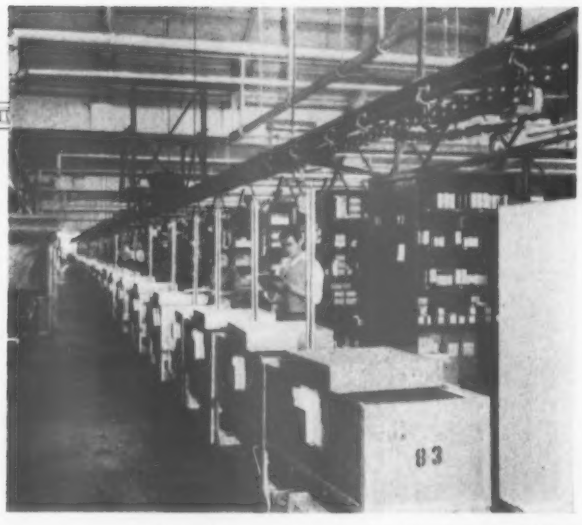
✓ *Slash Handling Costs*

✓ *Increase Plant Capacity 30%*

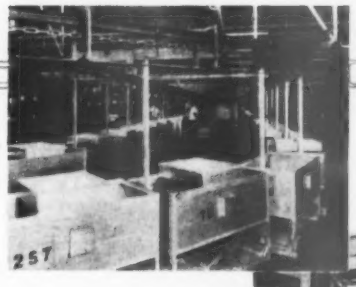
✓ *Eliminate Manual Handling*

for

CALIFORNIA DRUG COMPANY



Large orders travel on trucks through order filling room to packers. Vertical rod on truck engages and disengages conveyor chain automatically.



Small orders are filled and carried to packers on gravity and belt conveyors in an almost constant flow.

Belt and roller conveyors deliver all orders from packing areas to weighing station and then to shipping dock.

Through skillful application and installation of overhead chain conveyors, also belt and gravity roller conveyors, Webb engineers provided this California Drug Company with a unique combination of conveyors on two floors that substantially improved their material handling, increased capacity 30%, reduced handling costs, plus many gains in better service and control.

Complete conveyorization, based on sound engineering principles, is the secret of this successful improvement of operation. From the writing of orders (which are carried on a belt conveyor to the scheduling desk) to the packing and storage of filled orders, conveyors eliminate unnecessary manual handling.

One of the unique features of this conveyor system is the manner in which trucks automatically engage or are disengaged from overhead trolley type chain conveyors. On the front end of each truck is mounted a mast having a movable rod. This rod can be placed in either engage or disengage position by operation of a treadle at the bottom of the mast. Trucks are automatically disengaged when the treadle contacts the truck ahead.

With this arrangement, personnel keep complete control of all trucks on the conveyor and orders are kept in rotation. Reported results are a smoother operation following a regular path, where blocked aisles, backtracking and confused routing are never experienced.

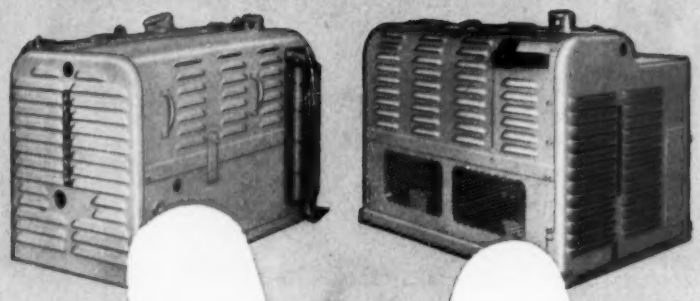
Conveyor Engineers and Manufacturers

Send for fully illustrated catalog that provides complete information on Webb conveyors

OFFICES IN PRINCIPAL CITIES • FACTORIES IN DETROIT, LOS ANGELES, HAMILTON, ONTARIO

READY-POWER

GAS-ELECTRIC DIESEL-ELECTRIC



Now... 2 Types of Continuous-Duty Power Units

FOR ALL ELECTRIC TRUCKS

Now you can select either gas-electric or Diesel-electric Ready-Power for any size or make of electric truck. GAS-ELECTRIC Models are for the tough materials handling jobs . . . DIESEL-ELECTRIC Models master the "impossible" jobs that keep trucks going day and nite, year after year. Ready-Power continuous-duty drive operates electric trucks at the lowest known costs per ton mile! Write us for additional information.

5th NATIONAL MATERIALS HANDLING EXPOSITION
MAY 18-23, 1953 PHILADELPHIA

Booth 1404 & 1501

The READY-POWER Co., 3820 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

FILM PROGRAM OF THE MONTH

Begins on page B-344

"PACEMAKERS FOR INDUSTRY" illustrates the use of overhead continuous power-driven trolley conveyors in solving materials handling problems. Applications in many industries are shown. 18 minutes. Write:

Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4.

"RAPISTAN GUIDED-PALLET CONVEYOR SYSTEM AT THE KINDEL FURNITURE COMPANY" demonstrates the use of a guided-pallet conveyor system. Illustrates plant layout for this type of system. 15 minutes, silent. Write:

Rapid Standard Co., Inc., Rapistan Bldg., Grand Rapids 2, Mich.

"HANDLING MATERIALS ECONOMICALLY THE HYDRAULIC WAY" shows the applications of hydraulic equipment. Featured are 2-door adjustable loading docks, ramp eliminator and railroad siding load dock, machine feed tables, and floor-to-floor hydraulic elevators. 12 minutes, silent, color. Write:

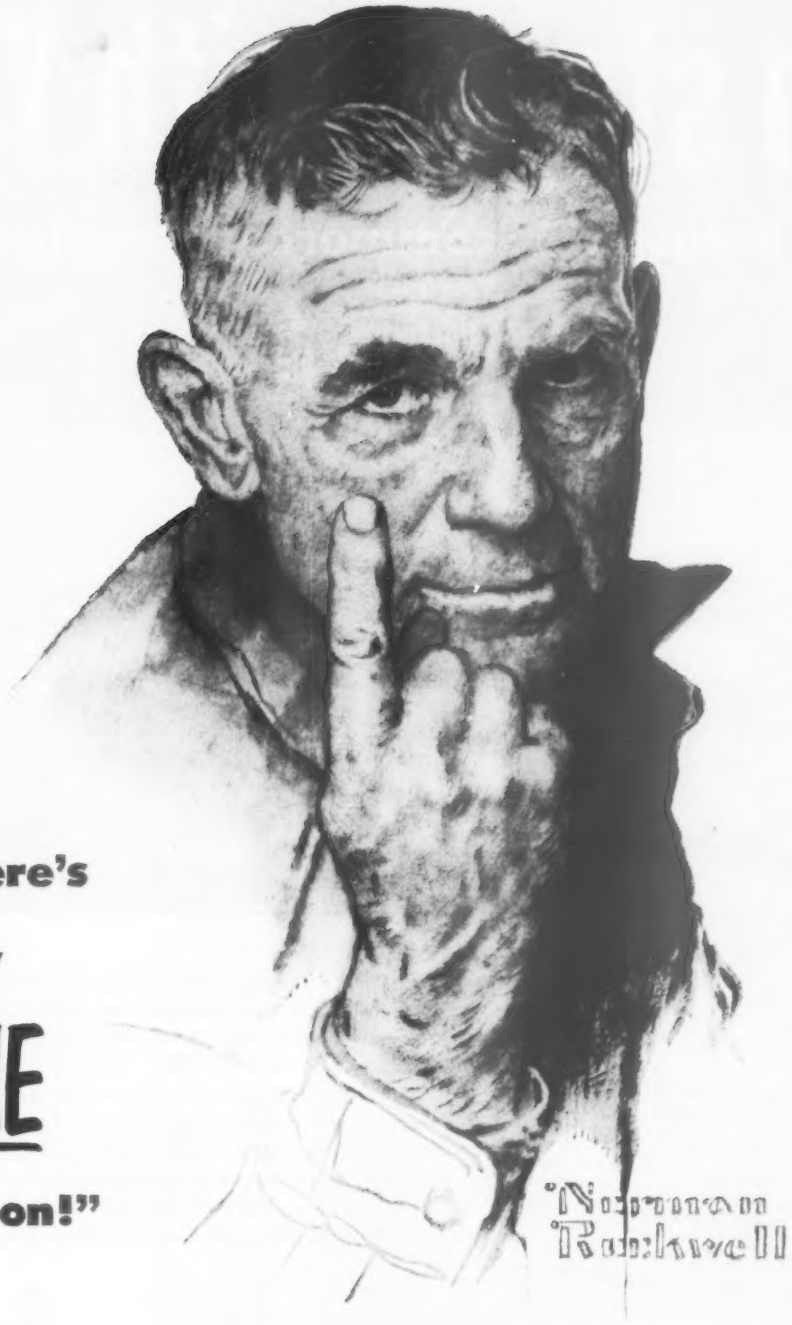
Joyce-Crider Co., Dayton, Ohio.

"CLARK MODERN MATERIAL HANDLING" traces the methods of handling from the hand truck to the fork lift. Stresses palletizing and shows a great variety of uses for fork trucks. 23 minutes. Write:

Clark Equipment Co., Advertising & Sales Promotion Dept., Industrial Truck Div., Battle Creek, Mich.

"TOP PERFORMANCE" is a general film on industrial trucks and hoists. Illustrates gas and electric trucks, motorized stackers, platform and pallet trucks, and hand and electric hoists. Attachments, too. Runs 22 minutes. Write:

Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15.



IT'S JUST THAT SIMPLE. There's only one reason in the world why 2 out of 3 materials handling men prefer Roebling wire rope and slings... *they cost a lot less on the job than any others.*

For top efficiency and economy, call your nearest Roebling office for a Field Man. He'll suggest the best ropes and Flatweave and All-Purpose Slings for your work.

JAR ROEBLING [CF&I]

A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N.J.

"On stage" with Yale

in industry... commerce... agriculture

YALE

Visit Yale "On Stage"

...at the 5th National Materials Handling Exposition.

Convention Hall—Philadelphia—May 18-22

See YALE Trucks and Hoists demonstrating the latest in modern Materials Handling Techniques.

Visit Yale's Hospitality Headquarters

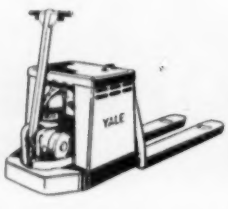
...at the Warwick Hotel, Philadelphia

To make your visit more pleasurable and profitable...YALE has planned a Hospitality Headquarters to serve you, your family and friends during your stay in Philadelphia.

In practically every phase of every business, YALE plays a star part...sets new performance records for efficiency and economy...saves time, work and manpower...slashes handling costs as much as 75%.

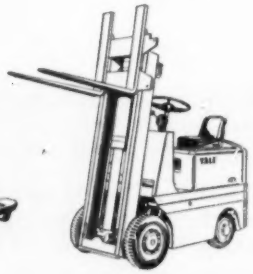
No matter what business *you* are in, you must receive, ship, store or process materials. And the cost of this handling vitally affects your year-end profit picture. That's why it will pay you to cut costs and speed production with YALE Industrial Trucks and Hoists. See the *complete* YALE line at the 5th National Materials Handling Exposition.

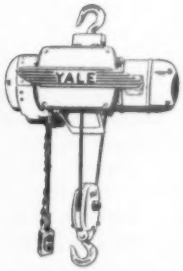
YALE Electric Trucks range from the new WAREHOUSER that maneuvers in aisles 6' or less to Giant Power Trucks that handle 100,000 lbs.



The YALE WORKSAVER line is the ideal solution where materials must be lifted, moved or stacked in limited areas...or over low-load flooring. YALE HAND TRUCKS have an almost universal application.

YALE Gas Trucks are the only Industrial Trucks that offer economical Fluid Drive for less down time . . . smoother starts and stops . . . greater safety.

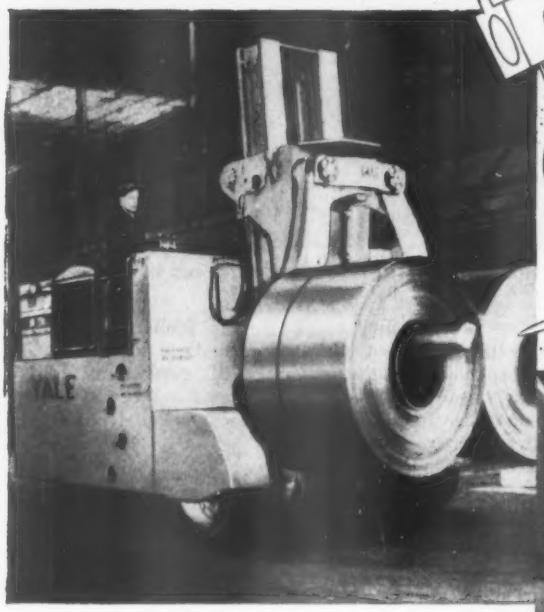




The YALE line of HAND and ELECTRIC HOISTS is the most complete line available. Here's an all-aluminum hand hoist that delivers 95% efficiency . . . weighs only 36 lbs. The other Hoist shown is the YALE Cable King Electric Hoist with exclusive features that mean extra efficiency and economy.

"Back stage" with Yale

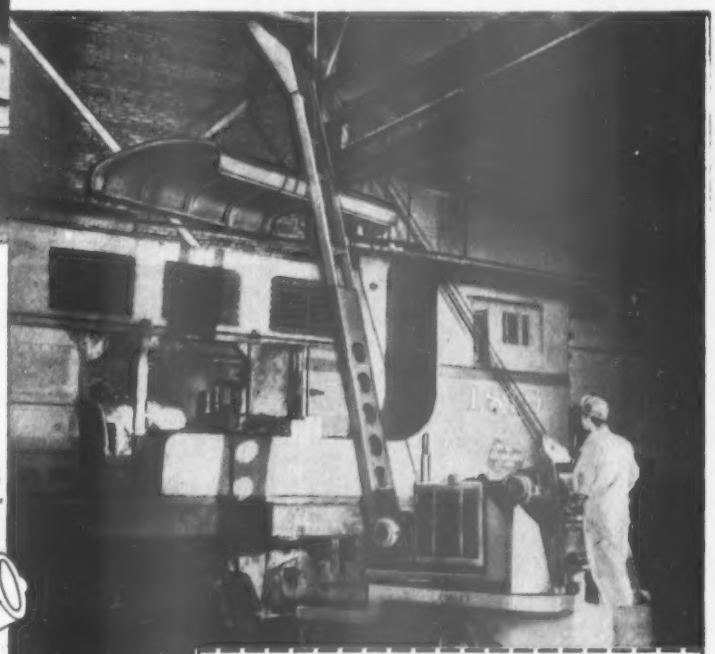
where an industry's quality standards are set



You are cordially invited "BACK STAGE" when you're in Philadelphia. Be sure to see the most modern plant devoted exclusively to making the Trucks and Hoists that have entitled YALE to the leading role it plays throughout industry.

See for yourself just how "quality" is built into every YALE Truck... Gas, Electric and Diesel—every YALE Hand and Electric Hoist. Learn how superior engineering, strict quality-control and long manufacturing experience combine to make YALE Materials Handling Equipment the finest that can be bought.

▲ Pictured here is the Giant YALE Ram Truck that lifts and moves loads weighing 100,000 lbs. or more. Like all YALE Trucks, it requires a minimum of maintenance for 'round-the-clock service.



▶ There's a rugged, dependable YALE Power Truck for every heavy-duty need... from powerful, versatile Tractors and Platform Trucks to massive Cranes like this.

YALE*

MATERIALS HANDLING EQUIPMENT

*Registered Trade Mark

MAIL THIS COUPON TODAY

The YALE & TOWNE Manufacturing Co., Dept. 35
Roosevelt Blvd. & Haldeman Ave., Phila. 15, Pa.

I'm interested in learning more about the time, work and money saving advantages of YALE equipment:

- ☐ Please send me detailed information on YALE Industrial Trucks
- ☐ Please send me detailed information on YALE Hoists
- ☐ Please have your local representative call for an appointment

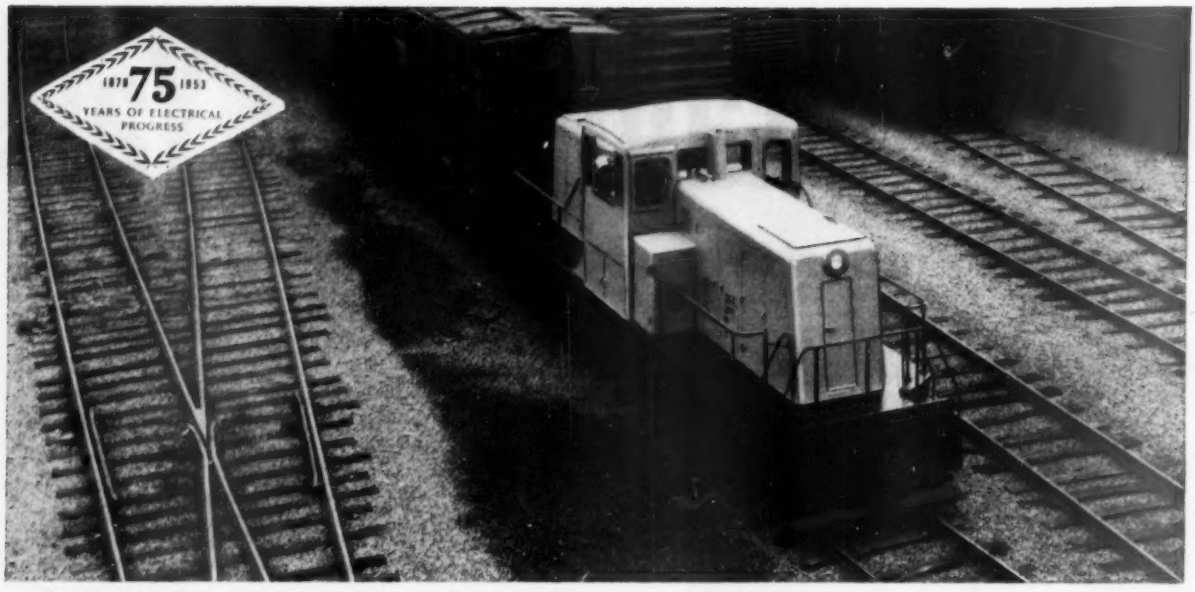
COMPANY_____

NAME_____ TITLE_____

STREET_____ CITY_____ STATE_____

In Canada write: The Yale & Towne Manufacturing Co., Box 337, Postal Station "A", Toronto, Ontario.

Gas, Electric, Diesel Lift Trucks • Worksavers • Hand Trucks • Hand and Electric Hoists • Pul-Lifts

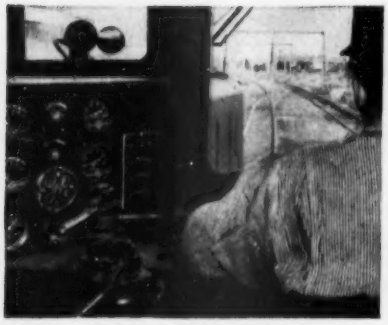


SAVINGS UP TO 30%, AVAILABILITY OF 90-95% ARE COMMON FOR THE MORE THAN 1800 G-E SWITCHERS IN INDUSTRY.

How G-E Switchers Can Help You Save Time and Money

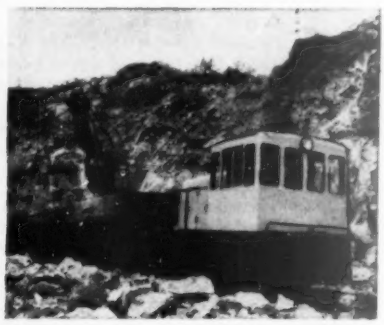
You can expect availability to the job of 8000 hours out of an 8760-hour year from the G-E industrial locomotive on your in-plant switching operation. This peak availability, plus nearly one-third savings in operating costs, can boost your switching productivity and cut costs from the very first day of operation.

High maximum speeds and tractive effort allow G-E switchers to move quickly from job to job, start big loads, spot cars smoothly and accurately. Switching time can be cut as much as 50% over old or obsolete motive power. Diesel-electrics operate for long periods between overhauls, require only periodic inspection and maintenance.



Easy to Operate Finger-tip control, wide visibility (above) and easy operation help reduce damage, cut operator fatigue. Responsive electric drive makes reversing quick and simple. Diesel-electrics start quickly with no time lost in warming up.

Save Manpower G-E diesel-electrics need only one man for operation, do not require special maintenance or servicing crews. Refueling (above) and oiling can be done quickly between job calls. Service and maintenance points are readily accessible.



More Work per Switcher You need fewer switchers for the job with G-E diesel-electrics. In many applications, G-E switchers have replaced steamers one for two with proportionate operational savings. Tough, sturdy construction means long, useful life.

G-E diesel-electrics have proven time and again, in every industry where they've been applied, that productivity and savings can go hand in hand on any switching job.

Write Section 120-55 for "Switch to Diesel-electrics and Save," a fact-filled bulletin on operating results and case histories. *General Electric, Schenectady 5, N. Y.*

GENERAL ELECTRIC

ACCO products

☑ Check your Hoist needs...

● Here's a check list of the complete line of WRIGHT Hoists that will show you the many models available for a wide variety of lifts around shop or plant.

WRIGHT Hand-operated Equipment

STYLE	TON CAPACITY
CRANES	
☐ Top running, hand traveling	1 to 25
☐ Underhung, hand traveling	1 to 10
☐ Jib type, wall mounted	½ to 3
END TRUCKS for Cranes	
☐ Top running, hand traveling	1 to 10
☐ Underhung, hand traveling	1 to 10
DRIVE UNITS for Cranes	
☐ Size 1, with ¾ hp. to 2 hp. motor	
☐ Size 2, with 3 hp. to 7½ hp. motor	
HOISTS	
☐ Wright Safeway, light, portable	½ to 4
☐ Wright Safeway, clevis-connected	½ to 4
☐ High Speed, improved	5 to 50
☐ Handwheel, extended	¼ to 3
☐ Twin hook	¼ to 10
☐ Differential	¼ to 1½
TROLLEY HOISTS	
☐ Wright Safeway Army type	½ to 3
☐ Improved Army type	4 to 10
☐ Hi-Way 600 type	¼ to 24
TROLLEYS ONLY	
☐ Timken	¼ to 40
☐ Hyatt	¼ to 5
☐ SARB	¼ to 12
☐ Wrightway	½ to 3
☐ Double beam	2 to 20

WRIGHT Motor-driven Equipment

CRANES	
☐ Top running	1 to 25
☐ Underhung	1 to 10
HOISTS	
☐ Frame 1, Speedway	¼ to 2
☐ Frame 1, Speedway, close headroom	¼ to 1
☐ Frame 1, Speedway, long-lift	¼ to 1
☐ Frame 2, Speedway (all suspensions)	½ to 6
☐ Frame 3, Speedway (all suspensions)	1½ to 10

WRIGHT SAFEWAY

WRIGHT SPEEDWAY

for information on the complete line of WRIGHT ELECTRIC HOISTS write for Catalog E-50A

ACCO

TRADE MARK

VISIT BOOTH 732, 5th NATIONAL MATERIALS HANDLING EXPOSITION, PHILADELPHIA • MAY 18-22

WRIGHT HOIST DIVISION
AMERICAN CHAIN & CABLE

York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

WRIGHT
Hoists
Trolleys
Cranes

HERE'S THE FORK TRUCK YOU'VE BEEN NEEDING . . .

ROSS SERIES 6

the only 6,000 lb. gas-powered truck with all these features . . .

OPEN TOWER
provides unobstructed vision for the driver, an important safety feature when operating in crowded quarters.

SINGLE-LEVER CONTROL
of hoisting and tilting makes operation easy, speeds piling, loading and unloading.

FOUR-SPEED TRANSMISSION
permits selection of four speeds forward, four reverse for any operating condition.

SAME TIRE-SIZE FRONT AND REAR
permits switching tires for lengthier service, simplifies stocking of spares. 7.50-15 standard, 8.25-15 optional

PLANETARY GEAR DRIVE IN WHEELS
reduces wear and tear on differential and drive axles, assures long-lived performance under adverse conditions.

For materials handling savings up to 75%, you can count on the Ross Series 6. It's engineered throughout for *all-around* top performance. Weight is balanced to achieve the best in stability and traction. It has more *live* counterweighting than any other truck of comparable size and ruggedness. It affords the best in driver-visibility. It's easy to handle, economical to operate.

When you need a fork truck in the 6,000-pound range, invest your money in a truck that's engineered for *your* needs. You'll be way ahead. For complete information on the Ross Series 6, call your nearest Ross dealer.

Rely On ROSS

THE ROSS CARRIER COMPANY

Direct Factory Branches and Dealers Throughout the World

725 MILLER ST., BENTON HARBOR, MICH., U.S.A.

Field Reports

Beginning on page B-144 you will find three field reports—just a taste of the mass of "raw material" from which FACTORY editors prepared the "trends" articles on pages B-1, B-78, B-198, and B-278.

Here are two more field reports—no editing, just the way they came to us. We found them packed so full of information and such good reading that we thought you would enjoy them, too.

Field Report No. 4

On National Video Corporation's new plant in Chicago. By Western Editor Walt Wagner.

THIS IS A NEW PLANT, which will not be in production until April. They manufacture television tubes, starting from the glass bulb. Plant cost about $7 per square foot. Single-story throughout.

Materials Handling

A fixed overhead monorail conveyor is used in transporting the tubes between operations. Flow is about like this: Glass tubes arrive in boxes, are stored. Brought from storage to a loading station on conveyor. There tubes are placed on conveyor and are off to a cleaning operation. They move successively through screening, assembly, evacuating, and sealing. Then arrive back at the same point they started.

And (here's a nice example of "integrating production and packaging") almost always it's possible to put a completed tube into the box they just took a glass tube out of. With the length of run they have, they estimate that this "out with the glass bottle, in with the completed tube" stunt will be possible 75% of the time. The remaining 25% of the time, because of changes in the size of tube being processed, the box won't be the right size—and they'll have to

Springs Cotton Mills

installs UNISTRUT® Pallet Racks

to increase storage capacity, speed finished goods handling, improve inventory control

Problem of efficiently storing and handling great quantities of bales and cartons solved quickly, easily, at low cost, by large textile manufacturer

The makers of nationally famous SPRINGMAID® cotton fabrics find UNISTRUT racks increase storage capacity, speed order filling and reduce damage to goods. These adjustable cantilever type pallet racks were recently installed on three complete warehouse floors at the Grace Bleachery, Lancaster, S. C., for the storage of finished goods.

With UNISTRUT framing there is no drilling, no welding, no special tools or equipment needed. Engineering is simplified—all you do is cut channel to size and bolt fittings in place. It's easy to work with and provides a construction material that can be used again and again without additional investment. You can build any type rack with UNISTRUT framing. Let us make a free rack survey for your business.

Write today for your FREE copy **of 24-page Catalog No. 600—"Racks you can build with UNISTRUT metal framing." Illustrates 46 different kinds of racks, and includes drawings and complete ordering information.**

1. Back view of rack—shows construction details. Loosening of bolts permits adjustment up or down to desired level.

2. Double entry rack allows 3-tier storage—utilizes all space to ceiling, has great strength without bulk.

3. Front view of rack illustrates cantilever arrangement of horizontal framing members and how they are mounted to vertical members.

4. Emphasizes wide, clean aisle to permit fast, easy handling of neatly stored, easily identified cases.

The new Springs Cotton Mills plant at Lancaster, S. C. (sketched above), was designed and engineered by Robert and Company Associates of Atlanta, who also designed the UNISTRUT cantilever pallet racks shown here.

Basic Components of the UNISTRUT Metal Framing System

Distributors and Warehouse Stocks in Principal Cities. Consult your Telephone Directories.

U. S. Patent Numbers
2327587 2329815 2345650
2363382 2380379 2405631
2541908 Other Patents Pending

The World's Most Flexible All-Purpose Metal Framing

UNISTRUT PRODUCTS COMPANY
1013 W. Washington Blvd., Chicago 7, Ill., Dept. M5

Please send the items checked below, without obligation:

- ☐ Rack Catalog No. 600
- ☐ UNISTRUT Sample

Name_____
Company_____
Address_____
City_____ Zone____ State____

bring empty boxes to the line for completed parts, carry away the boxes being unloaded.

Incidentally, they seldom store a completed tube more than 24 hours. With a projected production rate of 6000 tubes per day, you can see why—storage space required would be tremendous. They need most of their large storage area for stocking their "raw material"—the empty glass tubes, which they have to take from their suppliers when they can get them. They hope in the future to be able to schedule deliveries, so as to cut down raw stock storage.

RR dock is fully enclosed, motorized doors, holds 4 cars on two tracks (2 on each track). This requires two doors, but gives them more flexibility than one long track would.

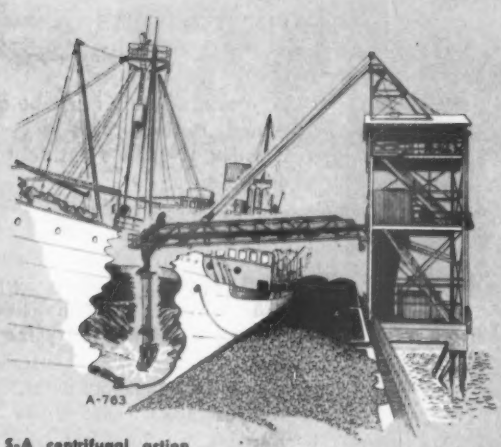
In warehouse area, they use five fork trucks, numerous portable roller conveyors. Storage is palletized. This makes them pretty flexible in the warehouse and shipping areas, as they have to be. And the fixed conveyor gives them lowest handling cost in the area where the process is standardized. Nice combination of the two kinds of handling. There's no manual handling anywhere.

Enclosed dock for four trucks—motorized doors to outside and to shop, minimizing heat loss.

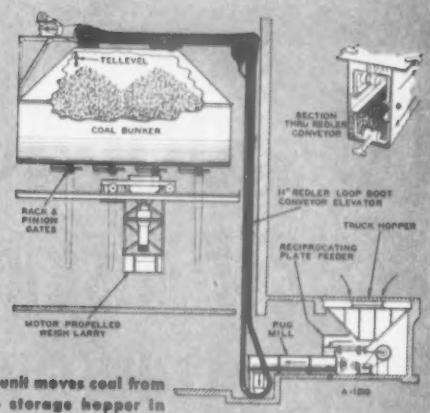
Buildings and Grounds

Why did they build new plant? They were operating in two small plants and had two separated warehouses. Everything was jammed up, and they needed more space. The new plant is only about 15 blocks from their old main plant, which will be kept in operation. And they're in a good labor market.

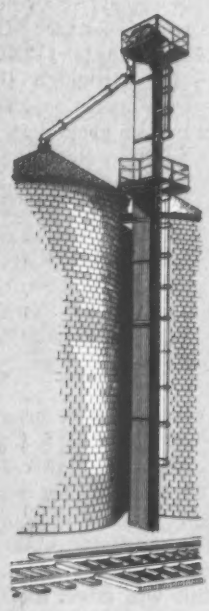
Bays are 30 x 62½ feet—large enough to give good flexibility of layout. In main production area, only partitions are walls around screening room (where screen is put into tube) and buffing room. Screening room is enclosed because this process is critical; must



S-A centrifugal action boat trimmer for loading and trimming bulk materials into holds of ships.



S-A REDLER unit moves coal from pug mill to storage hopper in totally enclosed, dust-tight casing.



S-A bucket elevator storing bulk materials in two silos.

Stephens-Adamson Engineers are Qualified to

SURVEY Your SYSTEM

for Handling Bulk Materials

We offer a check-up by our well-qualified staff of specialists in handling bulk materials—from lumps to powder.

The reasons for such a survey are *improvement* of product, and saving in handling cost. The recommendations you receive will be based on over 50 years of installing successful conveying systems. Since we make *every* type of conveyor, we can propose without prejudice the best type for your job.

A free survey will show whether your present system could be improved—and where. Write us, without obligation.

S-A belt conveyor with roller bearing equipped carriers.

STEPHENS-ADAMSON MFG. CO.

1 Ridgeway Avenue, Aurora, Illinois · Los Angeles, Calif. · Belleville, Ont.

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

whatever you need
you'll cut costs using

BUSCHMAN
CONVEYORS

A recent single order of BUSCHMAN Conveyors filled sixteen freight cars . . . almost *fifteen miles* of roller conveyor sections. The small business needing only a ten-foot section to span from loading dock to truck also looks to BUSCHMAN to supply its needs.

Whether your requirements are large or small, BUSCHMAN low-cost, rugged, light weight roller conveyors represent the easiest, most economical way to safely and quickly move packaged or self-contained products through any one or all phases of plant operations.

PRODUCE MORE . . . FOR LESS
on
Buschman Conveyors

Write For Bulletin No. 60

THE E. W. BUSCHMAN CO.
4425 Clifton Ave. Cincinnati 32, Ohio

Representatives in principal cities.

Canadian Licensee:
James A. McKechnie, Ltd. Toronto 13, Canada.

FIELD REPORTS

Begins on page B-352

be clean, and air must be conditioned. Buffing room is enclosed because it is a relatively dirty operation.

Interesting feature is the laminated wooden trusses. Costwise, they are about the same as steel. But they are only 39 inches deep, which is somewhat less than a steel truss for the same load; and therefore give greater clearance for a given roof height. These trusses are classified as slow-burning. Purlines are also wood, and roof deck is wood, with 5-ply paper, gravel and tar above—a 10-year roof. The columns, however, are steel. They figure these wooden beams will be easier to keep clean than a steel truss, since they are one smooth surface.

Present plant size is 112,000 square feet—and, although the plant is not yet in operation, they have already broken ground for a 50,000-sq. ft. addition. Reason for this: At time plant was designed (a year ago) the biggest size TV tube was 17 inches. Now, however, they manufacture a great many 27-inchers, and these tubes take more than twice the storage space of 17-inchers. The addition is to give them room for storage of these larger tubes.

They have an option on an additional 300,000 square feet of land for expansion. Building, incidentally, does not have curtain walls—one of the few such I've visited. Walls are brick, support trusses directly. They don't consider that this will affect expansion any—they merely plan to knock through large doors; and much of the handling to the expanded area would be by conveyor, requiring only an opening large enough for the conveyor and product to pass through.

Re low-cost maintenance: Operation is quite clean, so keeping building clean should be not too much of a problem. The screen room, which must be really clean, has tile walls. Floors are hardened concrete throughout. With the smooth-surfaced ceiling the laminated trusses give them, they

B.F.Goodrich

TW TIRE AND WHEEL ANALYSIS cuts industrial tire failures, saves you up to 50% on tire costs

WHAT caused your last industrial tire failure? Overloading, oily floors, rough hauling surfaces—all possibilities—or was it the *tires themselves?* If so, chances are that with the *right* tire you can increase tire life—perhaps even double it. Like the equipment they carry, industrial tires are designed to do specialized jobs. Point is, get the specific tire and job together.

B. F. Goodrich has developed the Tire and Wheel Analysis Plan to help you do just that. Without obligation, a trained BFG man will study your materials handling operations and recommend the right tires for you to use. His advice will be impartial, for B. F. Goodrich makes, and BFG retailers sell, a complete line of industrial tires.

Use the tires designed for the job and you'll save as much as 50% on tire and wheel costs through greater materials handling efficiency, less expensive maintenance and repair time.

To find out more about this free B. F. Goodrich Tire and Wheel Analysis Plan, send in the coupon or call your BFG retailer. A special TW Analysis Plan is available for manufacturers of industrial handling equipment.

Always specify B. F. Goodrich tires when ordering new equipment

The B. F. Goodrich Co.
Department TW-52, Akron, Ohio

Please send me:

☐ *Additional information* on your new Tire and Wheel Analysis Plan.

☐ A free copy of your "Industrial Tire Guidebook".

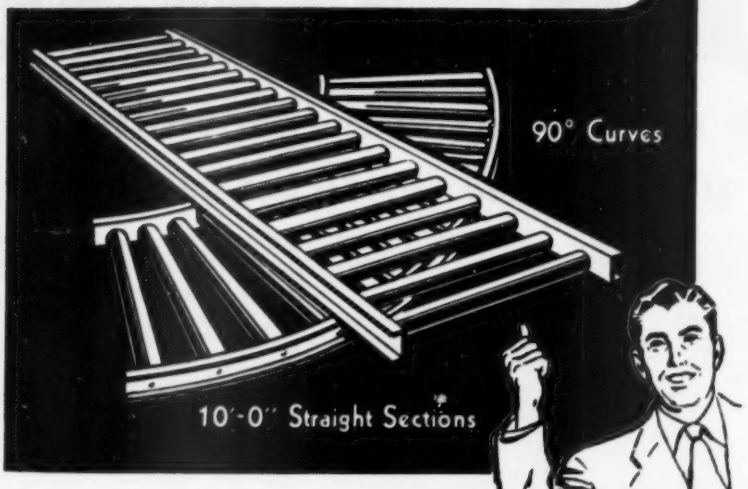
Name_____

Title_____

Company_____

City_____ State_____

SHIPPED TO YOU

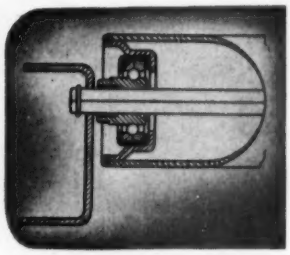


FROM STOCK

What are your current needs in roller conveyor? Logan Stock Roller Conveyor is offered in several sizes for average duty conveying. Roller spacing 4" or 6" centers. Roller lengths of 12", 16" and 20". Capacity 75 lbs. per ft. with supports on 10'0" centers and 380 lbs. per foot with supports on 5'0" centers. Both stationary and portable supports available. USE THE COUPON for further information.

FEATURES

ROLLER—2¼" O.D. No. 16 Ga. Welded Steel Tubing. Pressed Steel cup secured to tubing. Cap. 150 lbs.
SHAFT—7/16" Hexagon Cold Rolled Steel. Positively locked against rotation by hexagon holes in frame.
BEARING—No. 50. Slip fit in cup, easily removed and replaced. Protected position—set back from end of roll.
FRAME—3½" x 1¼" x 10 Ga. Pressed Steel Channel. With four 1-5/16" O.D. 13 Ga. Welded Tubing ties per 10'-0" section. Capacity 75 lbs. per foot with supports on 10'-0" centers and 380 lbs. per foot with supports on 5'-0" centers.
COUPLING—Furnished with bolted type for stationary service. Can furnish hook type for portable service if preferred.



DETAIL OF ROLLER

ALSO Stock WHEEL CONVEYORS
In both straight and curved sections. Ideal for portable use. Light-to-medium duty. Write for details.

Check your needs today!

Logan CONVEYORS
LOGAN CO., 510 CABEL ST.
LOUISVILLE, KENTUCKY

Logan Co., Louisville, Ky.
☐ Send literature on Stock Conveyors
Mr._____
Firm_____
Address_____

Begins on page B-352

figure they'll be able to clean overhead with a vacuum cleaner equipped with long attachments.

There is 5000 square feet of office space, 5000 of engineering space—about 10% of total area.

Paved employee parking area holding 300 cars. With about 330 employees per shift (plant will operate three shifts) this gives a pretty good ratio. They found by survey that about half their employees drive to work.

Plant Services

All service lines—steam, air, gas, process steam, compressed air, process gas, vacuum lines, chemical lines (they use a chemical in forming the screen inside the tube)—are labeled with adhesive labels.

Process water and chemicals are piped through stainless lines to insure cleanliness.

All lines are painted with aluminum paint—for good appearance and, in their opinion, best protection.

Sewers are the only service located in the floor.

Outlets are on 60-ft. centers throughout shop for flexibility. Relatively few are in use now.

Electrical power enters the shop at 440 volts, is distributed by cable to transformers located throughout the shop at 100-foot intervals. Available from these transformers: 440, 220, 110—one phase and three phase. Bus duct was not available when system was put in, but they feel present system is flexible enough without it. Electrical system is above bottom of trusses.

Compressed air, compressed gas, oxygen, and low-pressure air and vacuum lines run down the length of the building along the centerline. All can be tapped at 20 ft. intervals. Lines to point of use run along under roof, are dropped vertically.

All service lines are sized for maximum (three times present) building size.

Office is air conditioned, as is

Turn to page B-364

. . . built into your EDISON batteries

ACTUAL ON-THE-JOB RECORDS . . . in plant after plant . . . prove that EDISON batteries out-last and out-work other type batteries. Whether you figure years on the job, hours on the job, or tons handled—*records prove* EDISONS do the job better, longer, at lower cost.

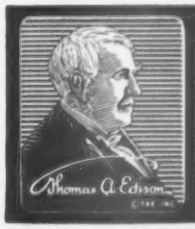
TWELVE TO FOURTEEN YEARS is the life recently reported by a user of more than 50 EDISON batteries. Many users report two to three times longer life with EDISON than with other type batteries. And the only regular attention required is watering, charging and occasional cleaning.

WITH STEEL CONSTRUCTION of cell containers, pole pieces, grids and other structural parts, EDISON batteries are practically indestructible. They're electrically fool-proof.

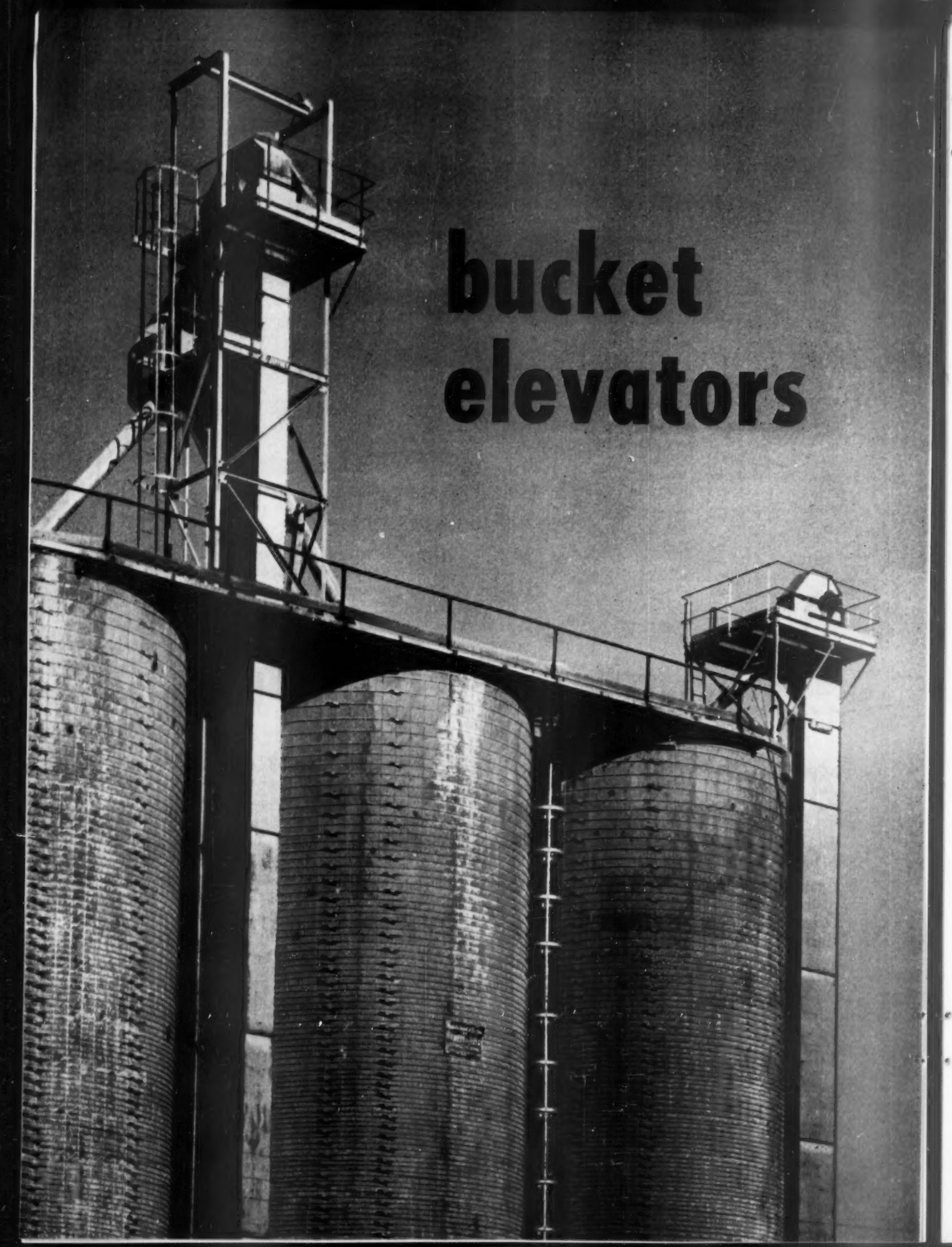
CUT YOUR HANDLING COSTS with longer lasting, harder working EDISONS . . . the batteries with ultimate lowest cost, least maintenance, least downtime. Call your Edison field engineer for specific information regarding your handling problems. Detailed Bulletins S.B. 2039 and S.B. 3808 are yours on request. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.

VISIT BOOTHS
240 • 244
341 • 345
MATERIALS
HANDLING
EXPOSITION
MAY 18-22

***Most Dependable Power —Lowest Over-all Cost . . . you get both with an* EDISON**



EDISON
Nickel · Iron · Alkaline
STORAGE BATTERIES

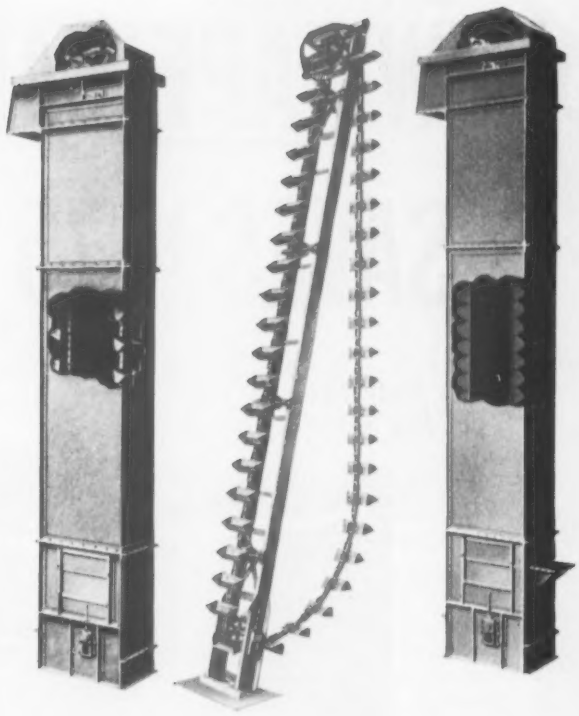

bucket
elevators

STANDARDIZED

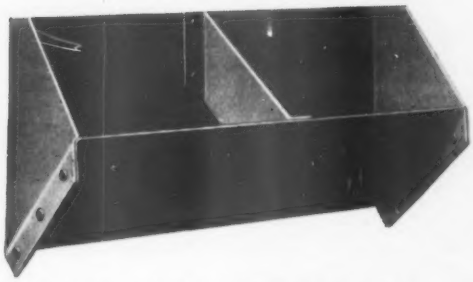
A Type and Size to Meet Most Requirements

Complete Drawings Available

Special Designs for Unusual Applications

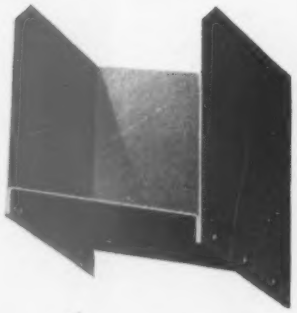


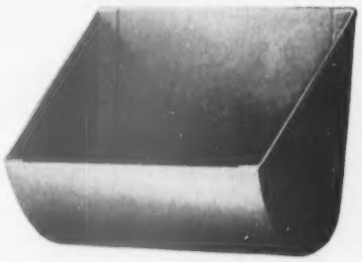
BACKED by { *YEARS OF EXPERIENCE* / *SCORES OF APPLICATIONS*



A continuous type bucket is shown above. Jeffrey Bucket Elevators have many improved features: welded angle casings, dust and weather tight, removable hood, increased bearing protection, large inspection doors and others. Let us tell you more about them.

Yes, Jeffrey Bucket Elevators have been STANDARDIZED — to SAVE you money, time and the expense of making layouts. Types include: centrifugal discharge, positive discharge, continuous bucket, super-capacity continuous, and the inclined centrifugal or continuous . . . mounted on chain or belt with Malleable Iron, Supermal or Steel Buckets. A few types are shown on this page.





THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

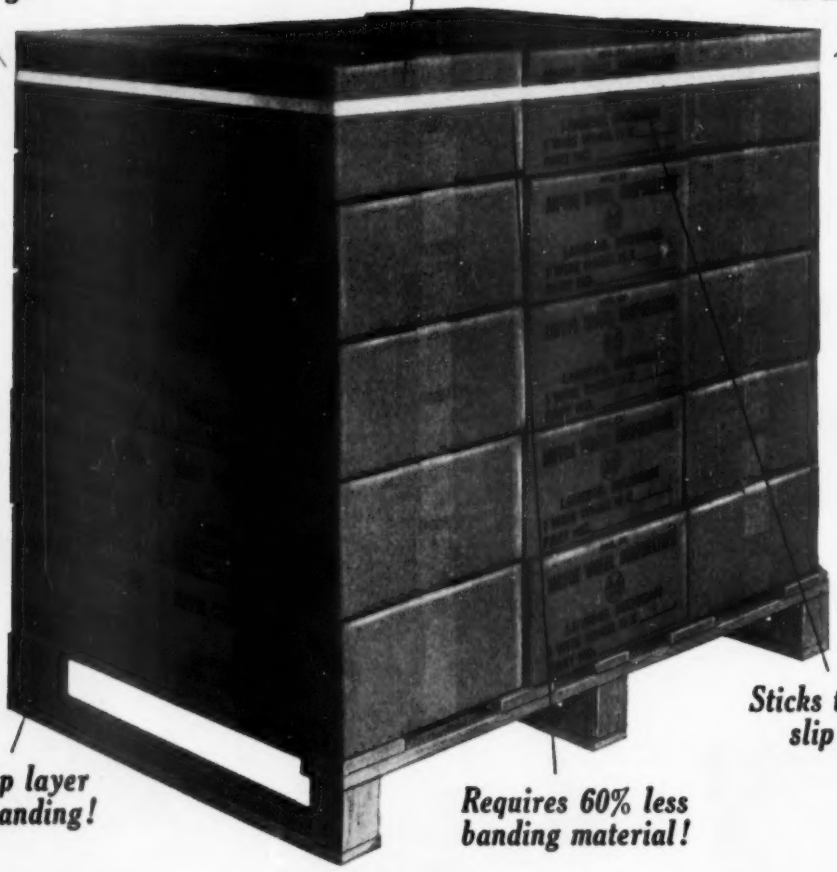
. . .IT'S A JOB FOR JEFFREY!

NEW TAPE BANDING METHOD SAVES $1.75 PER PALLET!

Needs no protective padding!

Single strip holds entire pallet!

Can't crush or cut into cartons!



Sticks tight—can't slip or slide!

Only top layer needs banding!

Requires 60% less banding material!

Forget old-fashioned banding methods and materials! Thorough testing of this new tape method proves a single strip of "Scotch" Brand Filament Tape is all you need to hold a palletized load in perfect shape!

Just wrap the tape around the top layer of containers and the job's done. See how this super-strong tape sticks tight, doesn't slip or slide, never cuts into cartons. And this tape is as easy to remove as it is to apply—no special equipment required!

No wonder manufacturers like Motor Wheel Corporation, Lansing, Michigan, report savings of $1.75 per pallet (like the one illustrated) over conventional banding methods!

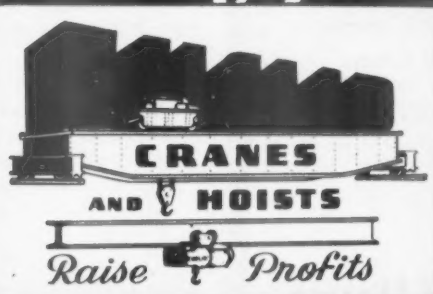
Try it yourself and see! Order "Scotch" Brand Filament Tape—in red, white, black or transparent—from your supplier today!

3M

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by Minnesota Mining & Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ont., Can.

SCOTCH FILAMENT TAPES

Specify

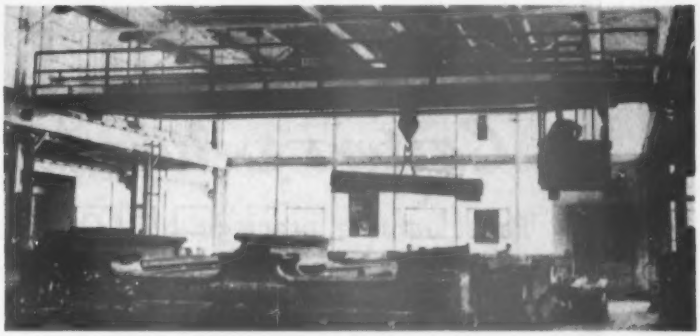


STANDARD "EUCLIDS" WILL HANDLE MORE THAN 90% OF YOUR MATERIAL HANDLING JOBS

Fortified with more than 50 years experience, we'll supply recommendations pertinent to the nature of your business and manufacturing operations.

Available in a wide range of capacities, types and spans, "Euclids" are speeding assembly lines and aiding in plant maintenance throughout the world.

Write or call for complete facts.



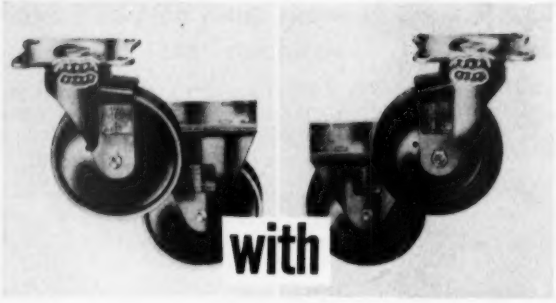
WRITE FOR CATALOGS

Submit specifications for prices and recommendations.

Always SWIVEL and ROLL

Made to save floors, equipment, money and time.

Save Valuable Man-Hours



DARNELL
Casters & Wheels

These durable, precision-built Casters assure the easy handling of heavy loads. Savings in floor and equipment wear soon pay for their cost. Ask your supplies dealer about Darnell products.

DARNELL CORPORATION, LTD.
DOWNEY (LOS ANGELES COUNTY) CALIFORNIA
60 WALKER STREET, NEW YORK 13, NEW YORK
36 NORTH CLINTON STREET, CHICAGO 6, ILLINOIS

the screening room. Air is dust-free, 70 degrees, 50% humidity.

Plant heated by unit heaters—steam.

They have a disposal problem. After screen is put into tube, the chemical that does the job is dumped automatically (by turning tube neck down) into troughs, which deliver the material to a filter pit. Filter picks up chemical, water seeps into ground. Pit will be periodically emptied, and new filter material added.

They have a public address system for intercomm purposes and to pipe music into the shop. Musak supplies different music for office than for shop.

Maintenance shop is large and complete — equipped with all kinds of machine tools. They made all their own equipment and machines in this shop, and are therefore obviously well-equipped to maintain them.

Field Report No. 5

Interview with Earl S. Fenelon, Department Head, Architectural Engineering, H. J. Heinz Company, Pittsburgh. By Midwestern Editor Bob Dilley.

Materials Handling

1. **Single-or multi-story.** Single-story construction is O.K. if land values are low and there is not any need in the process for gravity. In multi-story construction, costs are lower because the upper floor acts as a ceiling or roof for the lower floor. Also, distribution lines for steam, air, electricity, water, etc., are shorter and therefore more economical. In single-story construction, distribution lines are longer and construction costs are higher.
2. **Design around layout.** No question about the importance of this. Now people are developing economical layouts and then having buildings built around them.

Turn the page

Memo to: Men who use or plan to use materials handling equipment.

Subject: How to get the most for your money.

The CLARK EQUIPMENT COMPANY has produced and sold more than 150,000 trucks. This is a wide margin of leadership over anyone else in the materials handling business. We state this fact because we believe it has important bearing on your selection of materials handling equipment.

These are the reasons for CLARK's leadership:

1. Superior products

Obviously, to set sales records in an industry where there are many good companies, CLARK's product has had to excel. Industrial buyers are well-informed; they do not buy on the basis of advertising claims. The fact that more than 150,000 CLARKs have been bought by this select market speaks volumes for the product's quality.

2. Superior services

There is a lot more to selling materials handling equipment than merely "selling". The industrial customer buys equipment to do a job: to cut costs, to improve efficiency. CLARK has always felt responsible for giving the customer the right truck for the job, and then helping him get the most benefit from it. In other words, proper use of the equipment. CLARK's knowledge of materials handling can be measured in terms of 150,000 units of experience, more experience than any other industrial truck manufacturer. This, in addition to the equipment itself, is what you get when you do business with CLARK:

Methods engineering
Plant surveys
Factory field service and counsel
Dealer service and counsel
Preventive maintenance training
Driver training
Service school
Service parts
Continuing product and methods research

When you do business with CLARK, you get the most for your money. That simple fact explains why more people buy CLARKs than any other truck.

Very truly yours,

Your CLARK Dealer

Note: I'm listed under "Trucks, Industrial," in the Yellow Pages of your telephone directory.

MODERN TIME and COST SAVERS BUILT BY... Standard GRAVITY & POWER CONVEYORS

Standard LITEWATE Sectional Roller Conveyor

LIGHT AND EASY TO CARRY

Put it where you need it!

— ideal for loading and unloading trucks and conveying jobs that require moving about — one man can easily pick up and carry a section or curve with little effort. Handles commodities weighing up to 60 lbs. — moves bags, cases, cartons, hollow bottom, narrow, cleated and irregular packages or articles not suited to wheel conveyors. Available in 10 ft. and 5 ft. straight sections and 90° and 45° curves. Write for Bulletin 63 B — address Dept. **FM-23.**

Standard All Purpose Roller Conveyor

— available in a complete line of roller sizes and capacities designed to allow the selection of the best roller for the job, from a 1 inch diameter roller, capacity 35 lbs., to a 3½ inch diameter with a capacity of 550 lbs. Any commodity with one smooth riding surface can be carried — boxes, cases, cartons, lumber, milk cans, brick, building tile. Straight sections and 90° and 45° curves. Write for Bulletin 63 B — address Dept. **FM-53.**

Faster Handling in Shipping Rooms with the HANDIBELT

— conveys bags, cartons, boxes horizontally or at any decline and incline angle within its range. Easily wheeled about by one man — easy to adjust and use — fits in crowded aisles, cars, freight elevators. Handles packages up to 135 lbs. Can be placed in series to form a complete conveyor line. Available in 3 sizes: No. 11, No. 16, and No. 21 with 14 and 21 inch belt widths. Write for Bulletin No. 63 B — address Dept. **FM-23.**

Lift or Lower . . . Floor to Floor . . . with the INCLINEBELT

— move boxes, cases, cartons, sacks or bundles from basement to first floor, or any floor to floor — continuously. Compact, simple to install — minimum maintenance. Lift or lower 10 to 20 lbs. of live load per ft.; floor elevations of 8 ft. to 14 ft. 6 inches inclusive; belts widths — 8, 12, 14, 18 and 24 inches for commodities of various sizes. A horizontal feed section is generally used to deliver commodities to the Inclinebelt. Write for Bulletin 63 B — address Dept. **FM-53.**

STANDARD CONVEYOR COMPANY

General Offices: North St. Paul 9, Minnesota

Sales and Service in Principal Cities

Send for Standard Bulletin 63 B describing gravity and power conveyors units — address Dept.

Begins on page B-352

3. **Aisle space and procession areas.** Mechanical handling requires additional aisle space. Trucks are bigger, and loads are bigger.
4. **Aisle space and storage areas.** Fork trucks are forcing the increase in space. In its warehouse, Heinz often gets as little as 45% utilization of floor space because of the requirements of trucks.
5. **Provision of overhead equipment.** Heinz is doing just the opposite from most companies. It wants nothing overhead to collect dust or dirt because its product is food.
6. **Storage space is increasing** in proportion to processing space because inventories keep getting larger.
7. **Location of processing machines.** As machine speeds increase and their load and unload capacities increase, space around them must also increase. This is necessary to get materials to them and to service them. Fenelon sees a trend toward larger and faster machines and fewer of them, with a resultant increase in floor space per machine.
8. **Floor load capacities.** Heinz is now storing 750 to 1000 pounds per square feet on ground floors. Ten years ago it thought 350 pounds was a lot on self-supporting floors, and 600 pounds on ground floors. But as tiering heights increase, the floor capacity must also increase.
9. **Ceiling height.** It will go up in storage areas and be governed by the process in manufacturing areas. Heinz is currently using 13 to 14 feet in manufacturing areas and 26 feet in warehouse areas. Fenelon cautions that, as the height of the story increases, so does its cost of building. The idea is to compromise desired height with cost and to keep all processes compact.

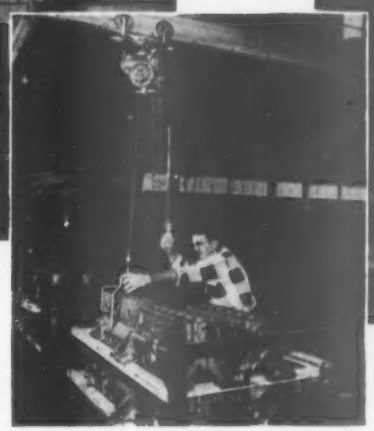
Turn the page

181 Air Hoists

...selected by Cleveland

Closing the molds on the 6-cylinder block line with Size BN Hoists and Pendent Throttle.

End of the line . . . Size LC-2 Hoist with Pendent Throttle speeds the loading of 12 finished blocks on special skids.



The Pendent Throttle for controlling the Size BN Hoist is mounted on this special core setting fixture.

Why production men choose I-R Air Hoists

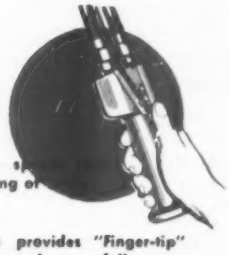
There are 58 sizes available. Lifting capacities range from 200 lbs. to 20,000 lbs.

POINTS OF SUPERIORITY

- **VARIABLE SPEED**—Lifting power ranges from a smooth creep to full speed.
- **OVERLOAD FACTOR**—Air motors cannot be damaged by overloading. More horsepower per pound of weight.
- **SMOOTH CONTROL**—A single rotary valve eliminates jerks and provides the exceptionally smooth power.
- **AUTOMATIC BRAKE**—A positive brake holds the load even though the air supply should fail.
- **POPPET TYPE THROTTLE VALVE**—Prevents air leakage when the hoist is idle.
- **SPOOL DRUMS**—Furnished in place of grooved drums where extra lift is desired.
- **LOW MAINTENANCE**—I-R hoists are universally recognized for their reliability and low maintenance.

PENDENT THROTTLE

The only complete line of air hoists with convenient "one-hand" control



• sp... ting of...

• provides "Finger-tip" control over full range of speeds

Ingersoll-Rand

11 Broadway, New York 4, N. Y.

869-B

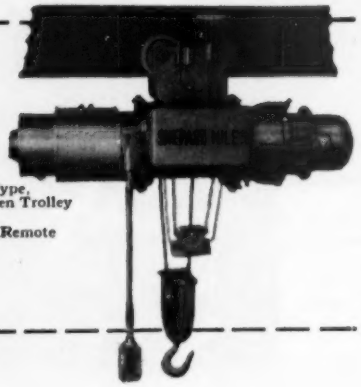
SOLVE MANPOWER PROBLEMS with a SHEPARD NILES Electric Hoist

● One man replaces many—and moves more goods faster—with a Shepard Niles Electric Hoist! These rugged hoists free floor space for production, put waste ceiling area to work. They enable an older man, woman or youth to handle heaviest loads with ease.

Learn how a Shepard Niles Hoist—in light, medium or heavy capacity—fits into your production picture. Call in the Shepard Niles representative—he'll help you select the right capacity and controls for your handling job.

2 FAMOUS HOISTS

Heavy Duty SHEPARD NILES Hoist

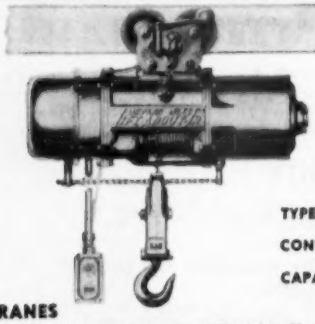


TYPES: Lug Suspension, Hook Suspension, Base Type, Push Trolley, Geared Trolley, Motor-driven Trolley

CONTROLS: Pendant Rope, Push Button, Outrig, Remote

CAPACITIES: 500 to 40,000 lbs.

SPEEDS: To meet your requirements—Write for latest bulletins.



Light Service, Low-Cost LIFTABOUT-JR.

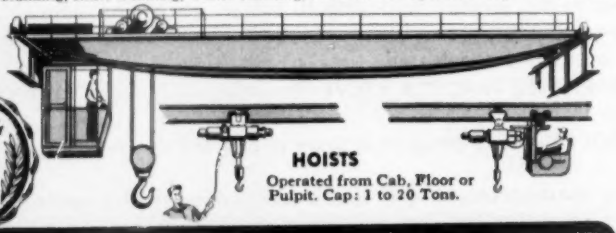
TYPES: Lug Suspension; Hook Suspension; Push Trolley

CONTROLS: Single Speed; Push Button; Rope Operated

CAPACITIES: 500, 1,000 or 2,000 lbs. Write for latest bulletins.

CRANES

Overhead: Top Running, Inner Running, Under Running, Floor or Cab Operated. Cap: 1 to 450 Tons.



HOISTS

Operated from Cab, Floor or Pulpit. Cap: 1 to 20 Tons.

50th ANNIVERSARY SHEPARD NILES CRANE & HOIST CORP. 1903-1953

SHEPARD NILES CRANE AND HOIST CORPORATION

1126 SCHUYLER AVENUE, MONTOUR FALLS, N.Y.

Begins on page B-352

10. **Pillars and columns.** Columns are best on multiples of the storage size of pallets. Generally, columns in Heinz buildings are spaced 28 to 32 feet, depending on pallet size. Fenelon likes to work out column spacing on the basis of cost of steel per square feet of the building. Steel meaning the steel in the building frame. He likes to use a figure of 5 to 6 pounds per square feet of floor space, and works out column space, in part, on that figure. As column space increases, so does the tonnage in the beam or truss overhead.
11. **Maintenance of materials handling equipment.** Heinz is now providing battery-charging rooms in its buildings and locating its maintenance shop for materials handling equipment near the point of greatest use of that equipment.
12. **Methods of planning plant layout.** More and more detail is going into plant layout plans. Heinz uses dimensional drawings in color to show flow of materials. It feels it can catch errors and see improvements with visual layouts. And they are good selling tools.

Buildings and Grounds

1. **Stream pollution control.** Right off the bat, Fenelon made the point that pollution control is of paramount importance now. He cautions that every company creating pollutants should provide for their treatment in new plant construction. He cited a brand new type of waste control currently in use by his company. It is called the bio-sorption process. Infilco owns the patents. The process is a high-rate activated sludge treatment. It works in hours instead of days. In small plants, where old methods

Turn to page B-374

Radio

CAN DO IT BETTER!

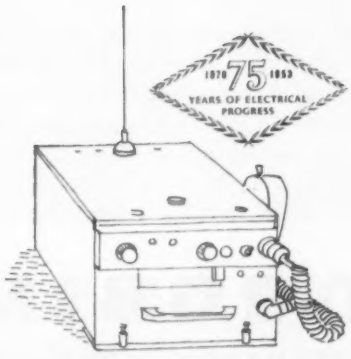
G-E 2-WAY RADIO delivers messages *instantly*— swings production rates and profits up!

As plant manager or owner you realize the value of communications . . . probably you organized a company system. It may have been messages on a line, signal flags, or even whistles but . . . that was yesterday! Today, when industrial communication must integrate many jobs to increase productivity and profits there's a better way . . . *G-E Industrial Radio.*

Radio messages—heard and answered in seconds—have produced amazing results. Large and small plant owners tell us of huge savings in operating costs and overhead expenses with *radio supervision on every job.* Radio equipped vehicles give you plus benefits of converting easily to a fire department, a plant police squad, a supervised team for any service or emergency!

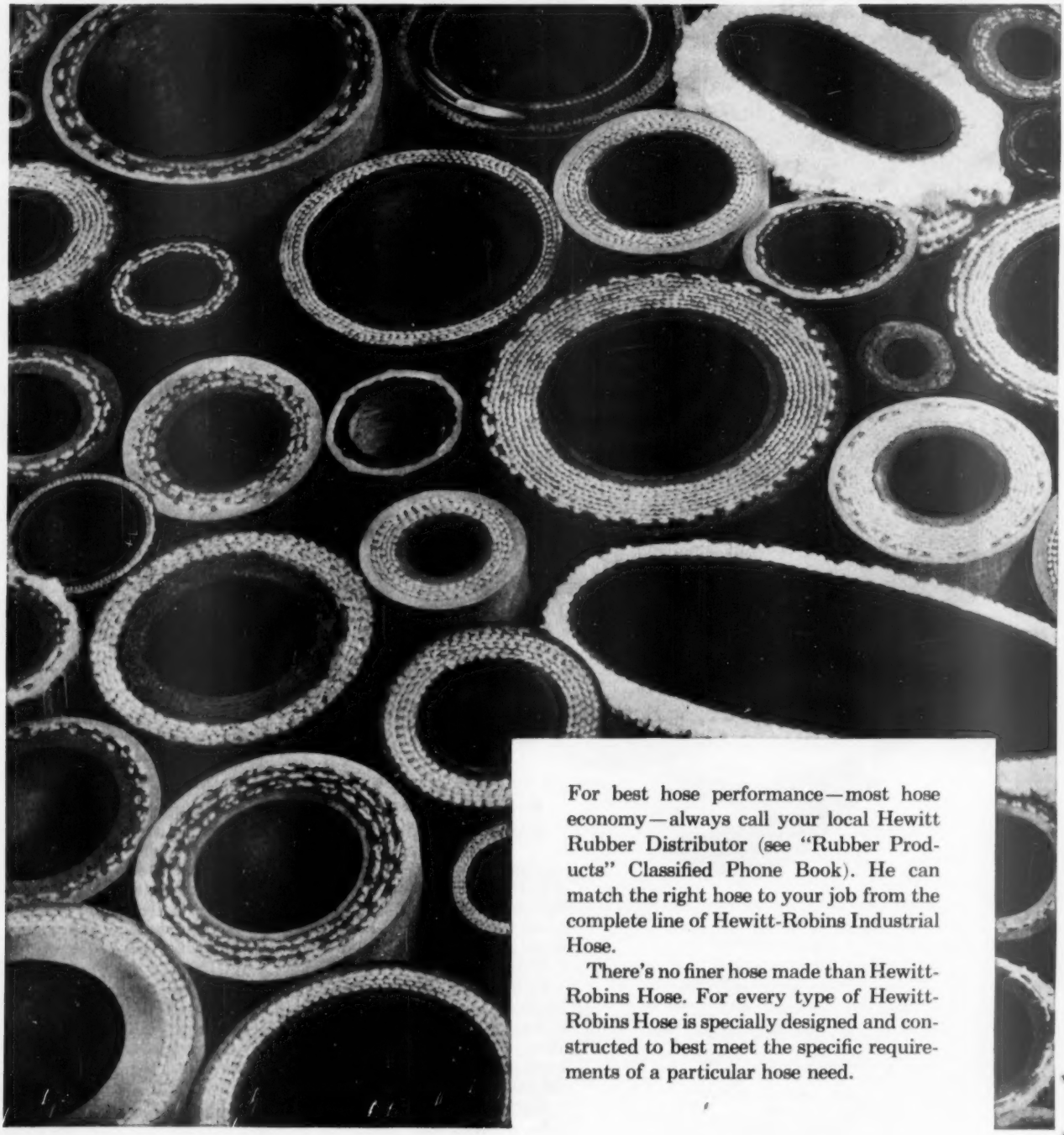
For expert advice on industrial communication, invite the CAS* man to attend your next plant manager's conference. Call the local G-E office today or write: *General Electric Company, Section 6553, Electronics Park, Syracuse, New York.*

**Communications Advisory Service*



GENERAL ELECTRIC

Get the Right Hose at



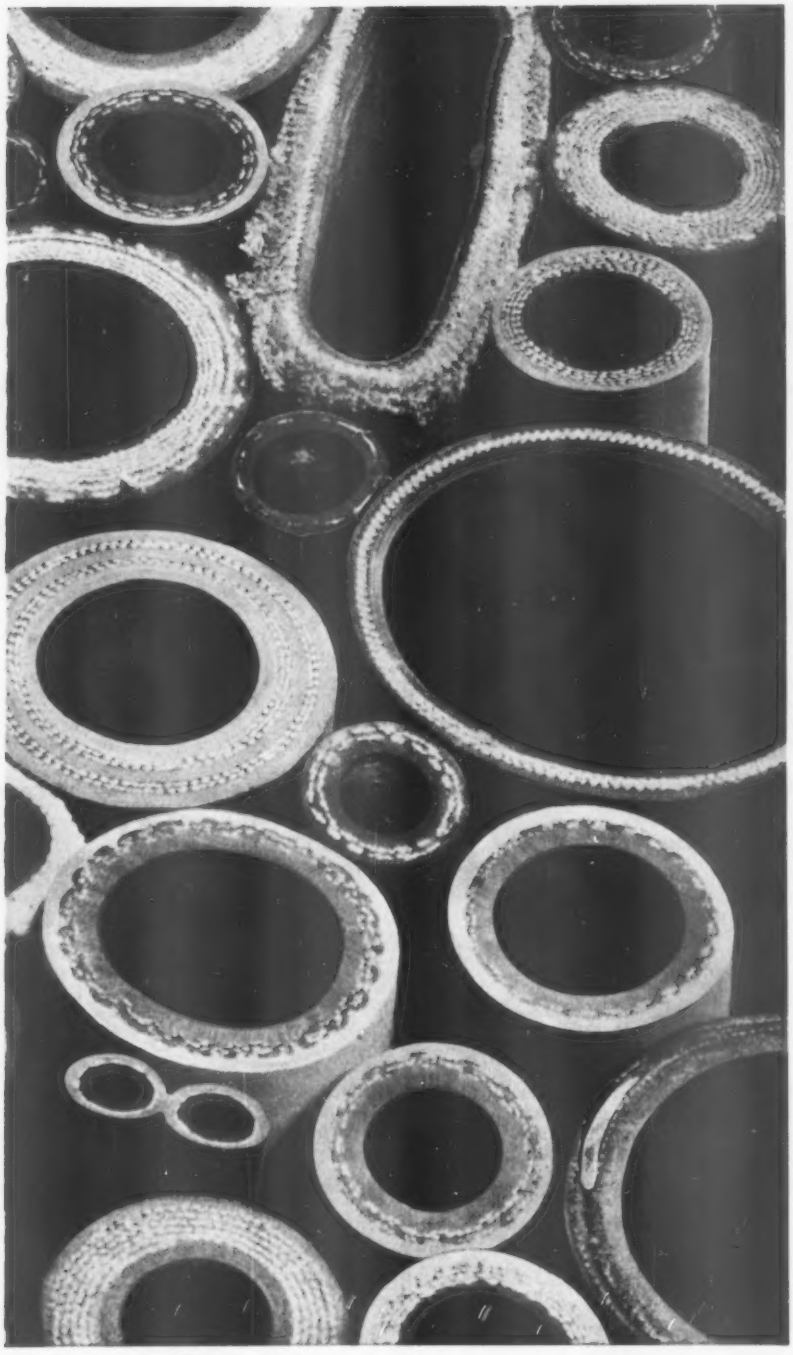
For best hose performance—most hose economy—always call your local Hewitt Rubber Distributor (see "Rubber Products" Classified Phone Book). He can match the right hose to your job from the complete line of Hewitt-Robins Industrial Hose.

There's no finer hose made than Hewitt-Robins Hose. For every type of Hewitt-Robins Hose is specially designed and constructed to best meet the specific requirements of a particular hose need.

HEWITT-ROBINS

EXECUTIVE OFFICES, STAMFORD, CONNECTICUT

Your Hewitt Distributor



INCORPORATED

DOMESTIC DIVISIONS: Hewitt Rubber • Robins Conveyors • Robins Engineers • Restfoam

FOREIGN SUBSIDIARIES: Hewitt-Robins (Canada) Ltd., Montreal • Hewitt-Robins Internationale, Paris, France • Robins Conveyors (S. A.) Ltd., Johannesburg • EXPORT DEPARTMENT: New York City.

CHECK FOR INFORMATION ABOUT THESE JOB-TESTED PRODUCTS FOR YOUR OPERATION

CONVEYORS:
- ☐ —Belt ☐ —Sectional
- ☐ —Vibrating

BELTING:
- *☐ —Hewlite® *☐ —Hot Materials
- *☐ —Raynile® *☐ —Transmission
- *☐ —Elevator
- *☐ —General Conveyor
- ☐ —Woven Wire

☐ BUCKET ELEVATORS

☐ IDLERS

SCREEN CLOTH:
- ☐ —Electrically Heated
- ☐ —General

VIBRATING SCREENS:
- ☐ —Dewaterizers
- ☐ —General

HOSE:
- *☐ —Acid *☐ —Air
- *☐ —Air Drill *☐ —Air Tower
- *☐ —Barge Loading *☐ —Fire
- *☐ —Flexible Rubber Pipe
- *☐ —Gas Curb Pump *☐ —LP Gas
- *☐ —Mud Pump Section
- *☐ —OS&D *☐ —Pinch Valve
- *☐ —Rotary Drilling
- *☐ —Rotary Flexible
- *☐ —Servall® *☐ —Steam
- *☐ —Tank Car *☐ —Tank Truck
- *☐ —Twin-Weld® *☐ —Water
- *☐ —Water Suction and Discharge

☐ MECHANICAL FEEDERS

☐ STACKERS

☐ TRIPPERS

SHAKEOUTS:
- ☐ —Car ☐ —Foundry

☐ BELT CLEANERS

*☐ PIPE SLINGS

*☐ GROOVED PULLEY LAGGING

*☐ MOLDED RUBBER PRODUCTS

*☐ RUBBERLOKT® BRUSHES

☐ DESIGN AND CONSTRUCTION OF COMPLETE MATERIALS HANDLING SYSTEMS

*For immediate information about these industrial rubber products, call your Hewitt Rubber Distributor (See "Rubber Products" Classified Phone Book).

Hewitt-Robins Incorporated
666 Glenbrook Road
Stamford, Connecticut

NAME

TITLE & COMPANY

STREET ADDRESS

CITY PO ZONE STATE

934

THE BAKER-RAULANG CO. 1853 100th anniversary 1953 THE BAKER-RAULANG CO.

A CENTURY OF TOPS

tops in 1853

WAGONS and CARRIAGES

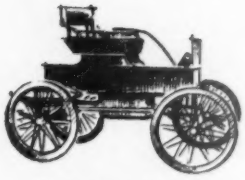
100 years ago our company started in business as a blacksmith and wagon shop.

tops in 1890

DE-LUXE CARRIAGES

Skilled craftsmanship soon earned the reputation of producing the country's finest custom-built carriages.

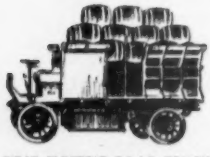
tops in 1898



FIRST BAKER ELECTRIC

This electric "horseless carriage" started Walter C. Baker in the motor vehicle business.

tops in 1910



FIRST ELECTRIC ROAD TRUCK

Durability and economy made this the best commercial vehicle in its day. In two years it was accepted in over 100 different trades.

tops in 1912

ELECTRIC "PADDY WAGON"

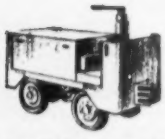
Catalog description: ". . . economy in your police department compared with horse drawn patrol . . . desirability from a *humane* and *sanitary* viewpoint".

tops in 1915

FIRST AUTOMATIC TRANSMISSION

The handsome "Owen Magnetic", Baker-built gas powered automobile with electric drive predated other automatic transmissions by 30 years!

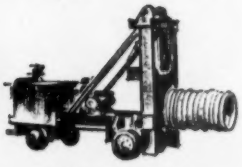
tops in 1917



FIRST BAKER INDUSTRIAL TRUCK

Baker pioneered mechanized material handling, entering the field 43 years ago. First Baker Industrial Truck, built in 1917, is still in daily use.

tops in 1922



FIRST RAM TRUCK

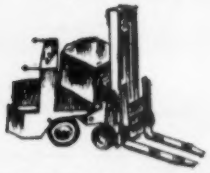
The first cantilever type self-loading industrial truck with mast and carriage for lifting loads mechanically. *FORERUNNER OF ALL FORK TRUCKS!*

tops in 1924

FIRST "LOCOMOTIVE" CRANE

Designed originally for assembly and maintenance of locomotives, the mobile electric crane was quickly accepted for a wide variety of industrial handling jobs.

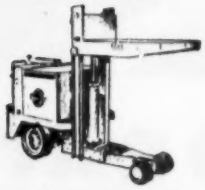
tops in 1936



FIRST ARTICULATED FORK TRUCK

Radical design which steered by pivoted frame. Used for stacking in warehouses with narrow aisles and for certain car-loading operations.

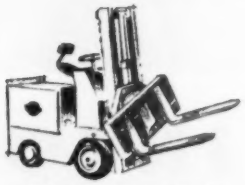
tops in 1942



FIRST HYDRAULIC HI-LIFT

The first hydraulic lift for a Hi-Lift Platform Truck was introduced by Baker during this year.

tops in 1952



FIRST ALL PURPOSE TRUCK

Combines fork clamping, spacing and side-shifting. With revolving head added, produces the "Octopus", which handles any shape load and stacks it in any position.

BAKER ACHIEVEMENTS

tops in 1902

FIRST DRIVE SHAFT AUTO

A pioneer in automotive engineering, Baker introduced the first drive shaft and rear axle bevel gear over 50 years ago.

tops in 1903

FASTEST THING ON WHEELS

"Torpedo"—Baker designed and built racing car sped 10 miles in less than 5 minutes. Top estimated speed was 132 MPH.

tops in 1905

SHOW-CASE ON WHEELS

First American car commercially equipped with closed body. One of the finest autos of its day, with spacious windows and smart interior. Many still in use!

tops in 1916

. . . and TOPS in 1953 with modern industrial trucks

In its first 100 years Baker has made many notable contributions to the science of transportation and material handling. Today, however, our management is looking *forward*, rather than reflecting on past achievements.

Entering our second century, we are in the midst of a revolution in material handling techniques. New developments are continually expanding the cost-cutting possibilities of mechanized handling. It is our policy to aggressively aid and abet the rebels in this revolution.

Baker's modern line now includes fork trucks, low and Hi-lift platform trucks, crane trucks and tractors. Present models are being constantly improved and new products added—the latest a gas-powered fork truck with automatic transmission.

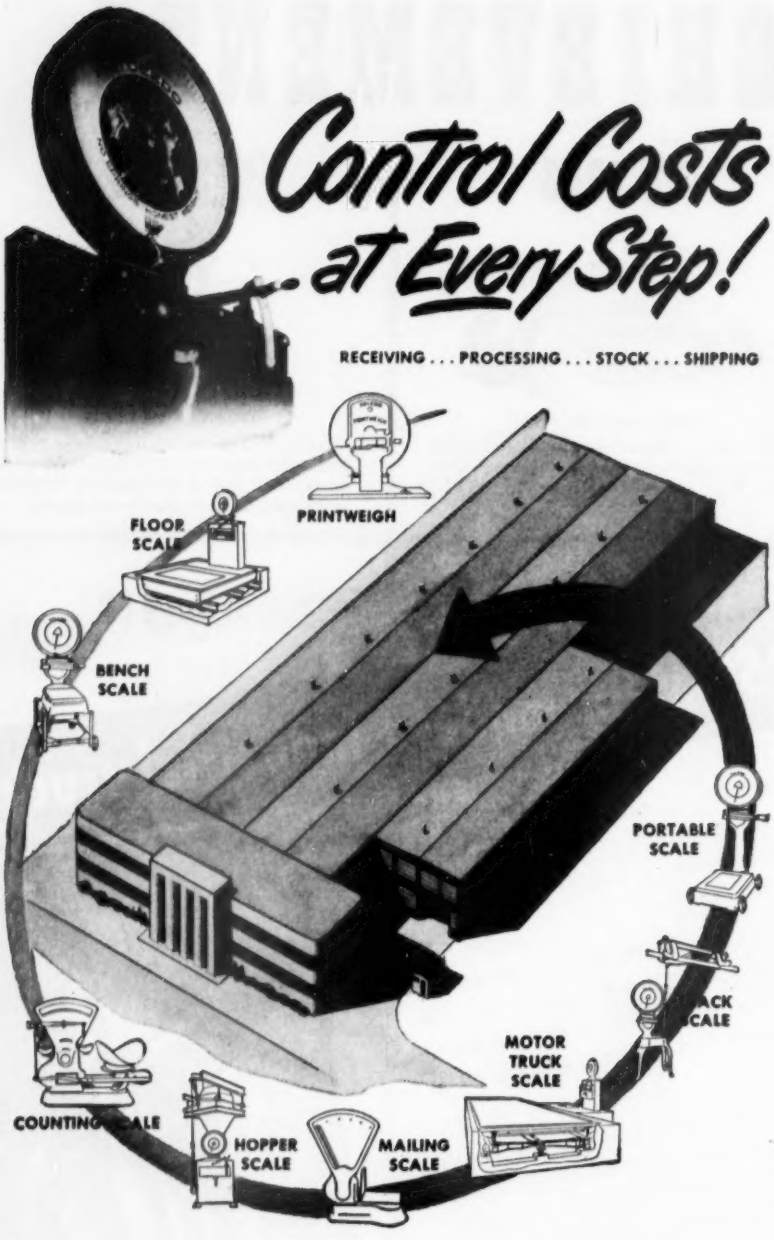
We have recently acquired Lull Manufacturing Co. (now the Baker-Lull Corporation). To Baker's reputation of "Tops on the ***INSIDE***", Lull now adds "Tops on the ***OUTSIDE***" with pneumatic-tired front end loaders, fork trucks, and side loaders.

See BAKER and BAKER-LULL products in operation at the Materials Handling Exposition.

THE BAKER-RAULANG COMPANY
1218 WEST 80th STREET • CLEVELAND 2, OHIO

The Baker-Lull Corporation • Subsidiary, Minneapolis, Minn.
Material Handling and Construction Equipment

Baker®
industrial trucks



Every time . . . on your scales material becomes money. Put modern Toledos on guard duty throughout your plant to *control costs . . . control processes . . .* and *control product quality.* Be sure you have the right scales at the right places . . . basic tools for measuring and gauging production, determining materials costs, fixing inventories, maintaining quality and uniformity, and eliminating waste. Check your needs *now.* Complete selection of models and capacities. Send for new 1953 edition catalog. Toledo Scale Company, Toledo 1, Ohio.

SERVICE

TOLEDO®

HEADQUARTERS FOR SCALES

FIELD REPORTS

Begins on page B-352

required a $300,000 to $400,000 investment, this new process cost Heinz $85,000 because they used some old equipment from a previous precipitation plant. Fenelon estimates it would cost $150,000 to $200,000 if all the equipment were new. These figures, of course, don't mean too much, unless you know the volume of effluent being treated and the degree of pollution in it. At any rate, the process is a biochemical process that oxidizes wastes out of the solution. The result is that the oxygen demand is reduced when the liquid waste is discharged into the stream.

2. **Regarding waste disposal,** Fenelon cautions that sewers and intakes must be planned and placed right to meet future requirements as well as current use.
3. **Heinz bases its capacity requirements in part on sales forecasts.** At present, the sales forecast to and including 1961 is used in facilities studies. Then these forecasts are translated into requirements for floor space, kettles, piping, pumps, conveyors, and so forth.
4. **A warehouse should first be** planned to economically receive, then store, and ship the merchandise to be handled. Then any types of construction and materials which yield a tent or envelope at least cost with the least amount of future maintenance give the best plant construction. Fenelon feels a 12-in. concrete block exterior wall —with no steel in the wall —steel frame, and gypsum roof with a built-up topping and in single story where land values permit, is the best type of construction at the present time for warehouses.
5. **Fenelon has considered the use of prefabricated panels** to eliminate painting, but

ACCO products

With these Parts YOU can assemble ACCO Registered Wire Rope Slings for 85% of your lifting requirements

DUALOC means dual lock. Two steel collars securely swaged around the ending double your security. Don't distort rope. Give full rope strength. Warranted by ACCO.

● Now you can buy ACCO *Registered* standard stock parts from which you can make infinite combinations of wire rope slings. If a new lifting job develops, you most likely can handle it with a different hook-up of the same standard ACCO *Registered* parts you use for regular lifts. But if you should need longer legs, or heavier legs, that's no problem either because everything you need is . . .

Stocked by Distributors

● ACCO *Registered* Wire Rope Slings and Fittings are stocked by ACCO Sling distributors. That means you can get quick service if you need additional parts, or if some part should become damaged. In case of damage, you don't send a "special" sling back for repairs. (You know how long that takes.) You just order a replacement part from your distributor who delivers promptly.

ACCO offers you a complete line of links, safety shackles and hooks. These items are all *Registered* and *Warranted* to have the same strength and dependability as the slings they are to be used with. ACCO *Registered* Wire Rope Slings are the best wire rope slings made.

***Find Out Now** what you can do with ACCO Registered Wire Rope Slings. See your ACCO Sling distributor or write our Wilkes-Barre, Pennsylvania, office for literature.*

ACCO

TRADE MARK

WIRE ROPE SLING DEPARTMENT
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO Registered Wire Rope Slings

Quick replacement paves way for NEW RECORDS with REPUBLIC CONVEYOR BELTING

for Profit-making Performance Every Time
buy REPUBLIC RUBBER PRODUCTS

The real keys to Profit Purchasing are performance and service. International Mineral & Chemical Company proved this on a tough job moving debris and wet rock tailings up a 15° incline at their Peace Valley Mine in Florida.

Although the load contains oily chemical materials which spell death for ordinary conveyor belts, there's been no trouble since Republic's Oil-Resistant Excelo Belts and Republic's local Distributor went to work. Here's the record:

Five years, non-stop performance, more than **10 million long tons of material moved before replacement was recommended for the first belt!** At that time, Republic's local Distributor was on hand to see that the switch was made smoothly and economically. Republic's Distributor will also be on the job when the second, younger belt needs replacement. Republic is always ready with the right product for your job and the kind of servicing policy that builds long-lasting and profitable relationships between you and the specialist in Industrial Rubber Products.

Your local Republic Distributor can help you plan, select, apply and maintain any product of Industrial Rubber. If his name is not listed in the yellow section of your telephone directory, it will pay you to write us now for his name and address.

REPUBLIC RUBBER DIVISION
LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO
INDUSTRIAL RUBBER PRODUCTS

Begins on page B-352

thinks their cost is not competitive.

6. **He favors glazed tile walls** for use in food plants—to eliminate painting and for sanitary reasons.
7. **He approaches all plant building problems with the idea of utility in mind** and then adds refinements as desired. For floors exposed to acids, alkalis, and greases, Heinz uses acid-proof tile. He thinks they make excellent kitchen floors and would make good processing floors where joined with a new resin-type compound that produces a thin joint.
8. **He prefers beam-and-girder construction** because trusses and other overhead equipment collect dust which has a habit of dropping. He mentioned Smooth Ceilings System Company, Minneapolis, that sells a smooth concrete ceiling with no exposed beams at all.
9. **Black-hot acid-proof mastic floor is good for acids.** But it won't withstand fats or greases.
10. **Curtain wall.** Panels are 50 to 75% more expensive than other acceptable materials. Fenelon feels their cost must come down. He says at this time nobody knows the ultimate maintenance cost of such panels because of their variety and industry's lack of long-term experience with them.
11. **Structural strength for expansion.** As you plan a stronger frame for ultimate expansion, or inclusion of heavier equipment, you must also strengthen the foundation. Fenelon feels the trend is to build with a reasonable amount of capacity expansion in mind. Heinz builds approximately 10 years ahead of present needs.
12. **Easier - to - operate doors.** Heinz uses electric-eye doors where temperatures vary

900-ft. Link-Belt TRUCK-TOW speeds freight car loading...

In this operation, TRUCK-TOW handles as many as seven assorted products from packers and any number of floor stock varieties to loading platform. The 400-ft. rail loading dock is efficiently supplied from 43 loading stations. System operates 24 hours a day, six days a week.

FLOOR TYPE TRUCK-TOW CONVEYOR OFFERS ADVANCED-DESIGN FEATURES

Especially popular where overhead structures interfere with fork-lift truck operation is the Floor-Type TRUCK-TOW. All moving parts are located below the floor.

Also eliminates 80% of manual trucking at General Mills' Kansas City mill

WHEN General Mills planned on coordinating movement of products from packaging to loading at their Kansas City mill, they consulted Link-Belt. The result: a 900-ft. TRUCK-TOW Conveyor that pulls detachable hand trucks, speeds loading of up to seven individual products.

In three years' operation, there has never been a production stoppage due to conveyor failure. Working conditions are improved . . . capacity increased . . . manual trucking reduced 80%. Such efficiency and versatility typify TRUCK-TOW applications throughout industry. Both overhead and under-the-floor types have proved their ability to increase handling capacity . . . reduce handling cost.

A call to your nearest Link-Belt office can lead the way to smoother, more efficient movement of materials in your plant. Our engineers will be glad to show you how TRUCK-TOW can save time and money for you.

LINK-BELT

TRUCK-TOW CONVEYORS

13,201

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

CM METEOR
WIRE ROPE
ELECTRIC HOISTS
Capacities: ½ to 5 tons

OVERHEAD SPACE could raise PLANT EARNINGS

FEATURES

that make the METEOR preferred by Production Executives

- Only 110 volts at push button control
- Low headroom
- Balanced design
- Single and two speed models
- Motor thermal protection
- Compact, enclosed construction
- Safety type hook blocks
- Airplane type cooling
- Helical gears for long life
- Precision bearings

Getting maximum production from already crowded schedules calls for most efficient use of floor space... and overhead space too. That's where CM Meteor Hoists offer real help. By moving materials overhead, you can take better advantage of floor space for production operations and attain greater speed and safety in handling. Worker efficiency is improved Designed for continuous duty even under dusty, moist, steam or acid fume conditions dependable Meteor performance keeps production flowing smoothly. Available with plain, geared or motor driven trolleys.

METEOR Catalog No. 142 shows all details of hoist suspension, operation and construction. Sent on request. Prices included.

CHISHOLM-MOORE HOIST CORPORATION

(Affiliated with Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York, Chicago and Cleveland • Distributors Everywhere

See us at Booth No. 1526—Philadelphia—May 18-22, 5th National Material Handling Exposition

Begins on page B-352

greatly between areas. In other places it leaves doors open.

13. **Glare-proof glass.** Yes, this company likes glare-proof glass and has used a tremendous amount of it in its new vinegar building. Fenelon considers aluminum wonderful for exterior sash. Heinz has used neoprene-caulked sash—a ribbon rather than a compound. By all means, sash should be puttyless.
14. **Floors suited to mechanized cleaning.** Heinz builds its plants so they can be hosed down from stem to stern with hot water. (Warehouse excluded.)
15. **Longer-lasting roofs.** Fenelon buys a 20-year bonded roof for two reasons. He wants the roof builder to lay and maintain the roof for the life of the bond. And if a contractor lays bonded roof, he supervises the job better. Fenelon deals only with large reputable companies which will be (or which he expects will be) in business during the roof's existence. He further insists that all flashing must be bonded and made up of the material used in the roof. He has no use for asphalt but wants coal-tar pitch.
16. **Less durable construction.** Heinz uses quonset huts, etc., for field storage of farm machinery and old production equipment.
17. **More land for expansion.** Fenelon feels Heinz has been pinched plenty, so he will always buy more land than is currently needed, especially since waste disposal is of increasing importance.
18. **Water supply.** In general Heinz depends on municipal supplies, but it is finding water more expensive to obtain in large quantities.
19. **Protective coatings.** Fenelon likes chlorinated rubber-base paints.

UNTOUCHED BY HUMAN HAND

MIKROS process 10 TONS of MENNEN Powders Per Hour in New MENNEN Plant

The name of Mennen stands for quality. So does the trade name MIKRO. It was only logical then, that the two should inspire the creation of a continuous processing system unique in the field of cosmetics, at the new Mennen plant in Morris Township, N. J. The MIKRO-designed process gave Mennen precisely what they wanted—extreme cleanliness and freedom from dust and contamination in grinding, blending and packaging. Material is moved through the MIKRO Air Conveying System so smoothly and automatically that the human hand need only push buttons.

The grinding and blending is done by four No. 2TH MIKRO-PULVERIZERS whose product reveals its finely ground and blended texture under a strong microscope.

Two MIKRO-COLLECTORS*, each containing 8, felt filter cylinders vent every unit in the system, while maintaining uniform pressure. Their phenomenal filter rates insure high capacity and complete product recovery, along with freedom from dust.

Thus the MIKRO method has given The Mennen Company not only the high quality they demand but peak production with economy in manpower, motorpower and maintenance.

WRITE FOR illustrated descriptive literature.

*Patents Applied For by H. J. Hersey, Jr. and Pulverizing Machinery Company

2136

MIKRO-PULVERIZER (FINE) **-ATOMIZER** (ULTRA FINE) **-COLLECTOR** (100 PER CENT)

REG. U.S. PAT. OFF.

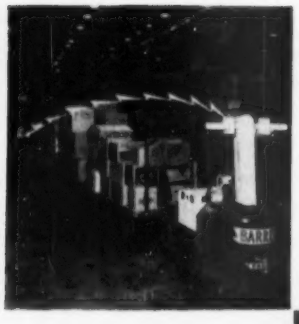
PULVERIZING MACHINERY COMPANY

24 Chatham Road • Summit, New Jersey

PRESERVE OUR HERITAGE: FAITH, FREEDOM AND INCENTIVE

BARRETT POWEROX

Built to stand the Gaff
Easy to maintain



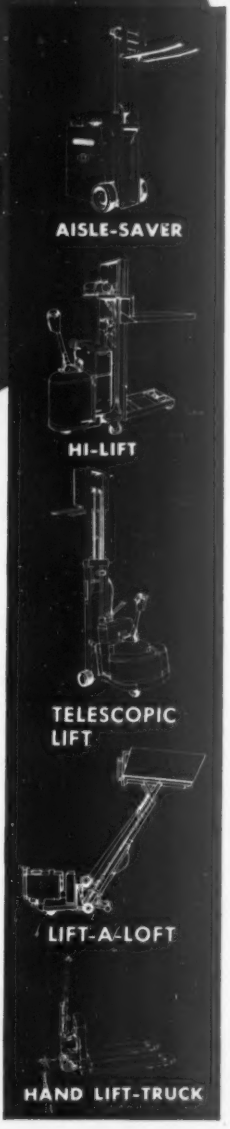
RADOX...Latest BARRETT development. RADOX is an electric tractor train operated by radio remote control. The operator starts, stops and turns the train merely by pressing a button on the control box attached to his belt. RADOX saves time in volume assembly by orders from stock. Write for details.

All BARRETT material handling equipment has the structural strength for rough, tough every day service. That means low operating cost...minimum down-time for repairs.

FOR EXAMPLE: The entire front shield of the POWER OX truck is removable in minutes using a screwdriver, only. All working parts are easily accessible for adjustment—but one of many features that keep costs down.

In the *complete* BARRETT LINE you will find rugged, labor-saving units designed for every material handling job. Consult your Barrett Field Engineer for recommendations on the equipment best suited to your requirements. He will gladly advise you regarding storage or handling problems.

SEE "RADOX" at booths 1350 and 1449. Materials Handling Show . . . Philadelphia, May 18-23.



BARRETT-CRAVENS COMPANY
4629 S. Western Blvd., Chicago 9, Illinois
Representatives in All Principal Cities
Canadian Licensee: S. A. Armstrong, Ltd., Toronto, Canada

Barrett Handling Equipment

BARRETT

ONE MAN DOES MORE THAN 3 OR 4 . . . WITH A BARRETT

REPRINTS

of FACTORY editorial articles are available as

PLANT OPERATING LIBRARIES

These include subjects of interest to every plant operating man.

Send for a list of titles.

Address:

The Editor,

FACTORY

330 West 42nd Street

New York 36, N. Y.

TIME-LABOR-MATERIAL

and a BETTER JOB

Nailed-on steel bands were formerly used by V & O Press, Hudson, N. Y., to hold heavy stamping presses on skids. Presses shifted in transit causing damage—making unloading difficult, dangerous.

Since introduction of the Stanley Steel Strapping System, presses *tension-strapped* to skids arrive at destination undamaged, unload easily, safely. Presses are packed faster, labor and crating materials saved, V & O customers pleased.

Try the Stanley Steel Strapping System in your plant for 30 days. No obligation. Send the coupon below.

STANLEY Reg. U.S. Pat. Off. **STEEL STRAPPING SYSTEM***

***A MAN** thoroughly experienced in steel strapping applications — the Stanley Packaging and Shipping Engineer.

A METHOD adaptable to any requirement—the Stanley Steel Strapping System with representatives in 32 principal cities.

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL

5TH NATIONAL MATERIALS HANDLING EXPOSITION MAY 18-22, 1953 PHILADELPHIA

THE STANLEY WORKS, Steel Strapping Division
201 Lake St., New Britain, Conn.

☐ Yes — the 30-day trial interests me. Have the Stanley Packaging and Shipping Engineer call.

☐ Send me complete information about the Stanley Steel Strapping System.

(Please write name and address in margin of page)

Team up with Mercury

GET THE JOB DONE FASTER – EASIER – AT LOWER COST

★ **Over 41 Years Experience in the Designing, Manufacturing and Installation of Material Handling Equipment.**

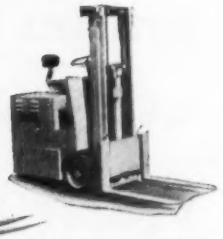
★ **The Most Complete Line of Equipment for BOTH Vertical and Horizontal Handling.**

★ **Originators of the Mercury "TRACKLESS TRAIN" System of Materials Handling.**

FORK TRUCKS

A few of the outstanding quality features of Mercury Fork Trucks include—*simple, single cylinder low* pressure hydraulic lift with patented cross suspension . . . magnetic contactor travel control with foot actuated, timed acceleration and controlled plugging . . . shockless wheel steering by means of compensating, controlled castor type trail axle . . . double reduction unit assembled drive.

"YAK" FORK TRUCK Model 430
4,000 lbs. capacity

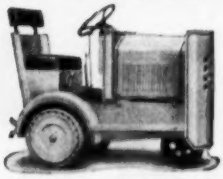


"JEEP" FORK TRUCK
Model 230
2,000 lbs. capacity

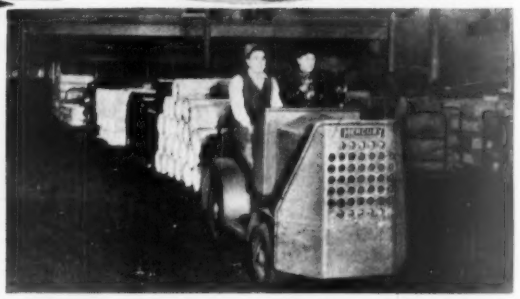
"YANK" FORK TRUCK
Model A-1544
6,000 lbs. capacity

TRACTORS AND TRAILERS

"Tug" Electric Tractor: Available in 3 capacities and 3 wheel, twin-3 or 4 wheel types.
"Banty" Gas Tractor: The smallest tractor made, yet develops a draw bar pull in excess of 2,000 lbs.



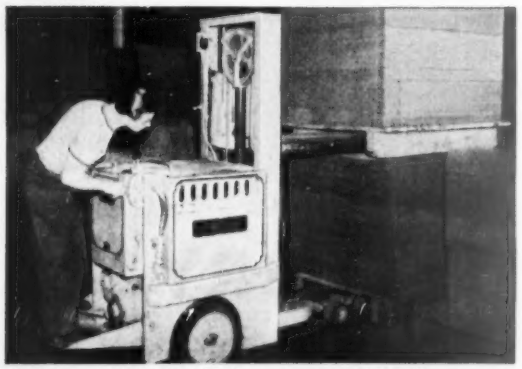
Also, "Huskie" and "Super-Huskie" gas tractors, 4 and 6 wheel heavy-duty models.
Trailer: Available in castor, 5th wheel or 4 wheel steer, platform or side dump types.



The Mercury "Huskie" tractor hauling a train of loaded Mercury type A-310 trailers in a large electrical manufacturing plant.

PLATFORM LIFT TRUCKS

Illustrated right is "Shuttle-Truk" 3-wheel burden carrier, 2,000 lbs. capacity. Illus. left is "Standard" high lift truck, 6,000 lbs. capacity.
Complete line includes narrow or wide models rated at 3,000, 4,000, 6,000 and 10,000 lbs. capacity with low, high or telescopic lift.

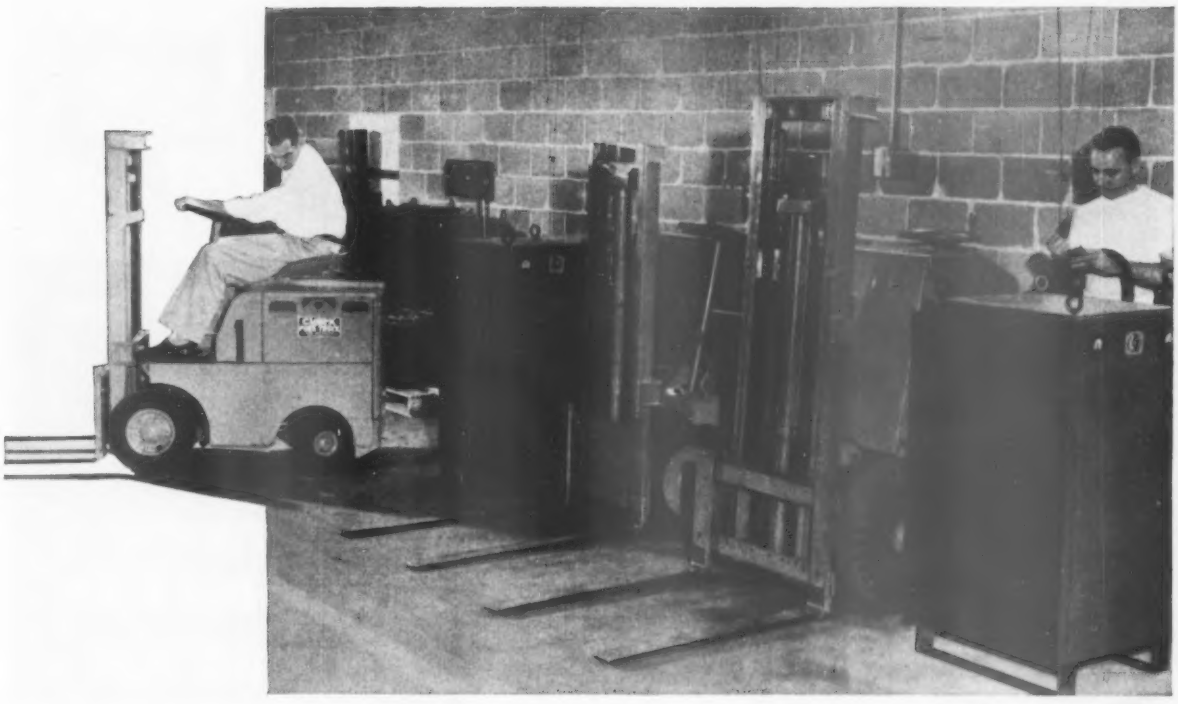


The Mercury Model A-1006 narrow type 4,000 lbs. capacity high lift truck stacking skids of corrugated paper in a carton manufacturing plant.

MERCURY
FORK TRUCKS · TRACTORS · TRAILERS

FREE Bulletin 300, a new 44 page catalog illustrating and describing the complete MERCURY line of Fork Trucks, Tractors, Trailers and Platform Lift Trucks.

MERCURY MANUFACTURING CO., 4110 S. Halsted St., Chicago 9, Ill.



Simply flip a switch and twist a dial for automatic battery charging

Battery charging becomes a simple operation with Westinghouse Rectox® Chargers servicing your trucks.

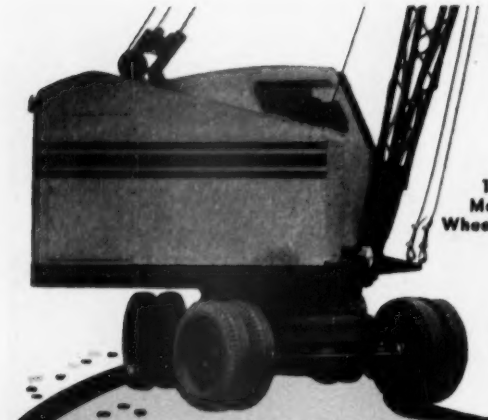
Rectox Chargers can charge either lead-acid or nickel-alkaline batteries and the specific charging cycle is selected by merely flicking a switch. As for the charging rate—it's speedily chosen with dials. All else in the charging cycle is completely automatic. There are no taps to change! It's really a fuss-free, time-saving operation.

Simplicity keynotes the Westinghouse Chargers. There is no installation cost—just connect into your a-c line. No foundations required. With but one moving part, a cooling fan, *maintenance* of Rectox Chargers is practically eliminated.

Particularly suited for *on-the-spot charging,* Rectox units eliminate wasteful runs to central charging stations, and increase truck availability.

Ask your Westinghouse Representative for full information, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-21795

YOU CAN BE SURE...IF IT'S Westinghouse



10-Ton
Model 20
Wheel-Mounted

IF YOU WANT TO
STAY ON TOP
OF YOUR
YARD OPERATIONS

HEAVY-DUTY
WAYNE CRANE
IS YOUR BEST BUY
BECAUSE...

IT TRAVELS • IT SWINGS • IT HOISTS • IT BOOMS

either
SIMULTANEOUSLY
or
INDEPENDENTLY!

This means no stopping, clutching and shifting at each operation—saves time and excessive wear—results are more production, less costly downtime.

Wayne Crane Model 20 has three equal speeds forward and reverse —no turn-around problem.

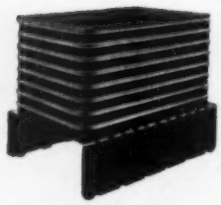
A Wayne Crane dealer is located in every major industrial city. See him or write TODAY for specifications and prices. You'll like both!

ALSO AVAILABLE

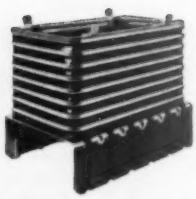
MODEL 40	12½-Ton Truck-Mounted
MODEL 66	8-Ton Crawler-Mounted

WAYNE CRANE
Heavy-Duty
INDUSTRIAL CRANES
8 to 12½-ton capacity

WAYNE CRANE DIVISION
AMERICAN STEEL DREDGE CO. INC.
FORT WAYNE 1, INDIANA



Type PB-120 steel box and skid platform unit.



Type PB-120T box and platform unit with tiering lugs.

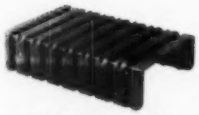
Specify this **NEW** Name

Republic

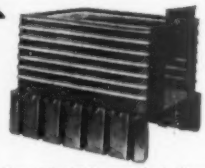
for the ones proven best in

STEEL BOXES AND SKIDS

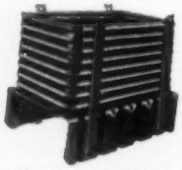
● Throughout industry these quality boxes and skids have been known and preferred for their outstanding ability to carry the load and keep things moving. Now, they come to you as "Republic" brand products—exactly the same in everything but name. Remember this name "Republic" when you want the best in steel boxes and skids for every purpose.



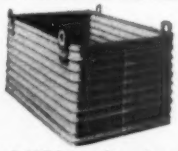
Type P-1 skid platform in your choice of standard widths, lengths and clearance heights.



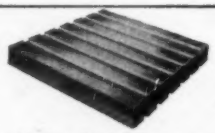
Type PB-650 box and platform unit with sliding end door.



Type PB-120-L box and platform unit with full length lifting lugs.



Type B-80C box unit equipped for crane handling; corrugated bottom.



Double-face Steel Pallets provide rigidity and strength with minimum weight; no sharp edges; economical; three types.

All Republic Steel Boxes, Skids and Pallets fully described in free illustrated booklet. Write us.

REPUBLIC STEEL

PRESSED STEEL DIVISION
REPUBLIC STEEL CORPORATION
6222 TRUSCON AVE. • CLEVELAND 27, OHIO

MOBILIFT "stand-ups" Stand Out!

MOBILIFT *Stand-Up* type Fork Lift Trucks *Stand Out* for efficient, low cost materials handling in warehouses, terminals and plants because they get more work done faster.

Here's Why:

1. The operator gets on and off an ample size platform in a second or two. He works standing up — has maximum all around visibility.
2. MOBILIFTS are fast and agile. Compact design, short over-all length. 360° steering mechanism makes ZERO inner turning radius and 57" outer turning radius possible (2,000-lb. Model "E"). MOBILIFTS are long-time favorites for close, congested working areas.
3. LEV-R-MATIC push-pull controls speed all movements. NO GEARS TO SHIFT . . . push-pull levers for forward-back movements, elevating and tilting.
4. MOBILIFT air-cooled 3-cylinder engine delivers abundant, reliable power. It's compact, precision-balanced and accessible for economical operation with minimum repair and service.

Let a MOBILIFT Sales Engineer show you why MOBILIFT Stand-Ups in your business will Stand Out!

Write or wire MOBILIFT for complete information today . . . No obligation of course.

MOBILIFT Lev-R-Matic DRIVE

MOBILIFT CORPORATION

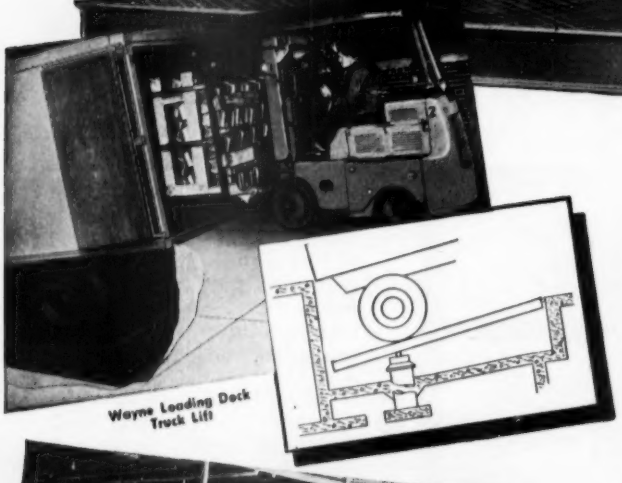
835 S. E. Main Street • Portland 14, Oregon

2317 W. 18th, CHICAGO • 790 Patterson Ave., E. RUTHERFORD, N. J. • 2724 Taylor St., DALLAS
2730 San Pablo Ave., BERKELEY • 1113 Spring St. N. W., ATLANTA

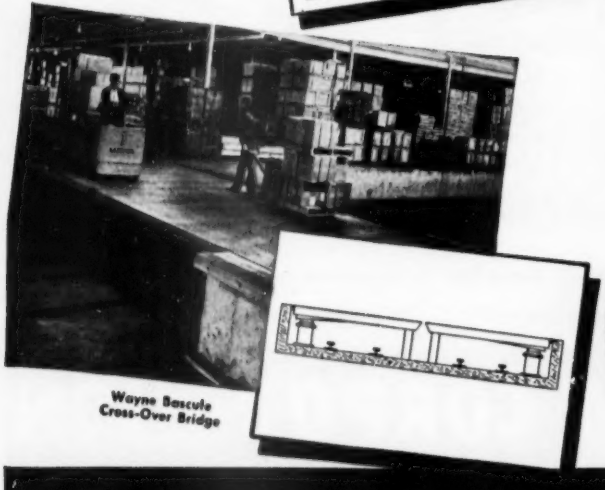
LOADING TIME CUT 75%

WASTEFUL HAULING ELIMINATED

WITH Wayne LIFTS



Wayne Loading Dock Truck Lift



Wayne Bascule Cross-Over Bridge

Wayne Loading Dock Ramps can slash 75% from truck loading time . . . Wayne Platform Lifts speed inventory stocking . . . Wayne Cross-Over Bridges eliminate roundabout hauling. From unloading of raw materials to loading of finished products, there's a Wayne Industrial Lift to speed your production, cut handling costs.

Wayne Lifts are custom-engineered to your plant's requirements . . . designed to save you time, labor and money . . . keep maintenance and down time at minimum. Other Wayne Lifts include truck lifts, sidewalk elevators, service lifts—all "precisioneered" for years of trouble-free operation and stepped up production. Write today for new Wayne Industrial Lift Booklet.

THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND • TORONTO, CANADA

Wayne

NATION WIDE SERVICE

WAYNE LIFT DIVISION, Ironton, Ohio

Which of these PACKAGING IDEAS will cut *your* costs?

- *Reinforced*
- *Waterproofed*
- *Six widths*
- *Easily dispensed by "cut-off" type machines*

Our Industrial Papers Have Solved These Problems!

Can we help *you*?

Stronger Wrap for Big Packs

Angier's new Glass Wrap is reinforced with strong glass fibres to give *better* protection at less cost. Waterproofed; flexible; up to 96" wide.

☐ *Check here for facts.*

Vapor-from-Paper STOPS RUST

Saves greasing. Saves degreasing. It's Angier's *proven* vapor rust preventive —VPI® Wrap. Easiest, *sure* way to store or ship your metal products.

☐ *Check here for facts.*

Center-seam Sealing with Reinforced SNAKE TAPE

It's the *fast* way to seal cartons. Yet, that *one* strip along the center seam gives you a *stronger* closure! That's because Snake Tape is reinforced to give strap-like strength.

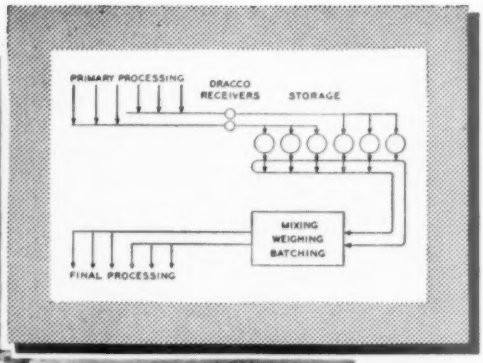
Center-seam sealing is accepted for parcel post, railway express, air express, and truck shipments; it also is accepted for carload and LCL rail shipments where rule 5, section 1 (c) of Uniform Classification applies.

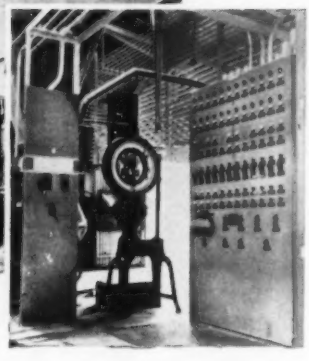
☐ *Check here for FREE sample & facts.*

☑ Check the ideas that interest *you* and send with letterhead to:
ANGIER CORPORATION
Framingham 1, Massachusetts

Angier

SINCE 1895 MANUFACTURERS OF INDUSTRIAL PACKAGING PAPERS





Materials flow diagram shows how Dracco "Airstream" system moves materials from primary to final processing with storage en route in silos (above). One man operates system from control panel (right).

Synthetic Fiber Plant Reduces Handling Labor 96%

One man instead of thirty!

That is the remarkable 96% reduction in materials handling labor produced by an automatic Dracco "Airstream" Conveyor at a large synthetic fiber plant. The Dracco system, effectively integrated into the chemical production process, has also improved product quality and uniformity.

This "Airstream" installation moves materials at rates up to 15 tons per hour from primary processing to final processing with intermediate storage en route. Two types of powdered plastic materials are accurately mixed, weighed and batched, assuring less product spoilage and better, more uniform quality.

One man operates the entire system from a single nerve-center control panel. From this point he can maintain precise control over the 3000-foot, dual-line "Airstream" system. Former manual and mechanical handling methods for the same job required thirty men per shift.

This new concept of "Airstream" conveying integrated with the production process is establishing similar records for economy in many plants. To learn how your plant can profit from this modern Dracco technique, write or call Dracco today.

AN "AIRSTREAM" CONVEYOR IN YOUR PLANT MEANS:

Less labor cost with automatic handling

•

Lower material cost thru bulk purchasing

•

Flexible, space-saving, dust-free handling

•

Low maintenance . . . greater safety

DRACCO CORPORATION
4075 East 116th Street · Cleveland 5, Ohio

Technical information on "Bulk Materials Handling with Airstream Conveyors" is presented in Dracco Bulletin 529. Write for your copy today.

DRACCO

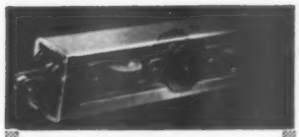
Performance Proved

Airstream **CONVEYORS · DUST CONTROL EQUIPMENT**

Save Space! Cut Costs!

with R-W "Zig-Zag"®

Continuous Power Conveyor



Engineered for Economy and Flexibility

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves —two-foot radius.

Richards-Wilcox ZIG-ZAG Continuous Power Conveyors are the last word in materials handling efficiency. Products of many sizes and shapes are carried at various speeds, smoothly and safely. Loss through handling mishaps is reduced to a minimum. And the overhead installation releases valuable space for other uses —increases the efficiency of the plant many times.

ZIG-ZAG—a steel, tube-like track through which travels a specially constructed motor-driven chain—will carry unit loads up to 125 pounds at speeds ranging from 1 inch to 60 feet per minute. It's designed to go up and down, in and around "like water through a pipe." And ZIG-ZAG is flexible, too—if changes or relocation are required you can take it down here and put it up there, and in most cases, *use all the parts!*

* * *

Learn how patented ZIG-ZAG can save space and cut production costs. Send today for details—or better yet, have an R-W engineer consult with you at no obligation.

Stop by our booths, No. 1552 and 1556 at the Materials Handling Show in Philadelphia.

1880 RICHARDS WILCOX R-W AURORA TRADE MARK Reg. U. S. Pat. Off. 1953

SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT • INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS • ELEVATOR DOOR OPERATING EQUIPMENT

Richards-Wilcox Mfg. Co.

"A HANGER FOR ANY DOOR THAT SLIDES"

410 THIRD STREET, AURORA, ILLINOIS

Acme Steel Strapping Insures S.A. *(Safe Arrival)*

and eliminates Crating Department bottleneck for Hotpoint!

"BEFORE" HOTPOINT RANGE PRODUCTION LINE STALLED. Hotpoint workers found the hand stretcher method (shown above) too awkward in fastening corrugated board for shipping protection to new ranges as they poured off the production line. The line kept backing up.

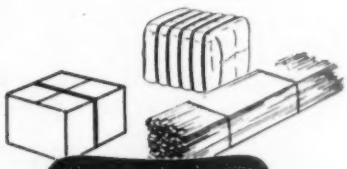
"NOW" ACME STEEL PNEUMATIC STRETCHER ELIMINATES BOTTLENECK, CUTS COSTS! The same workers now tension pre-cut Acme Steel strapping with an Acme Steel pneumatic stretcher. Shipping preparation costs have been held as much as 20 per cent below normal industry shipping costs. One operator says, "A man couldn't last all day before—too hard on the arms. Now with the Acme Steel system it's easy to keep ahead of production."

There it is. A clear cut case of how Acme Steel and know-how in steel strapping has helped a leading manufacturer solve a critical problem.

Chances are that many of your own production assembly or packing and loading problems can be cleared up with Acme Steel strapping, the best way to protect your product in shipment.

You will also learn that Acme Steel strapping, and the Acme Steel tools that work with it, will save materials and pay for themselves in a short time. Employees are happier because they know increased production means more, steadier jobs.

There are dozens of cases in the files to prove that nearly everything made to eat, wear, sit on or live in can be assembled and packed swiftly and will arrive safely with Acme Steel strapping. For specific examples, write to Acme Steel Products Division, Dept. FMM-53.



ACME STEEL

ACME STEEL COMPANY

ARCHER AVENUE, CHICAGO 8, ILL.

New Trends in Mechanized Materials Handling

WITH ALLIS-CHALMERS TRACTOR SHOVELS

FEEDS HOPPERS, CONVEYERS. Special high-speed reverse increases output on short runs between stockpile and hopper. Steel tracks stand up in cullet and other sharp, abrasive material.

EXCAVATES, LOADS TRUCKS. This busy crawler has the power to dig into hard-packed materials—and bring it out, a full cubic yard at a scoop. In handling light materials, an interchangeable two-yard bucket doubles its capacity.

STOCKPILES COAL, SILICATES, ANY BULK. Traction and flotation enable this crawler to work right up on a stockpile . . . allow it to spread and compact coal in thin, horizontal layers to eliminate spontaneous combustion.

HANDLES PACKAGED AND SOLID MATERIALS. With Lift Fork in place of bucket, the HD-5G skids, carries and stacks palletized loads weighing up to 4,000 lb. Stacking height beneath forks is 106 inches.

Crawler tractors — basic machines on earth-moving and construction jobs — are now solving more and more bulk materials handling problems in industry with hydraulic front-end shovels. And spearheading this new trend is the Allis-Chalmers HD-5G — thousands of which are now in use in plants of all types. This multi-purpose crawler combines power, traction and maneuverability with a wide selection of hydraulically operated attachments for a variety of material handling jobs.

Get the full story on how crawler tractor power and versatility can help mechanize your tough jobs. Ask your Allis-Chalmers dealer about the HD-5G and these three larger tractor shovels: 2-yd. HD-9G, 3-yd. HD-15G and 4-yd. HD-20G. Light materials buckets range from 2 to 7 cu. yd.

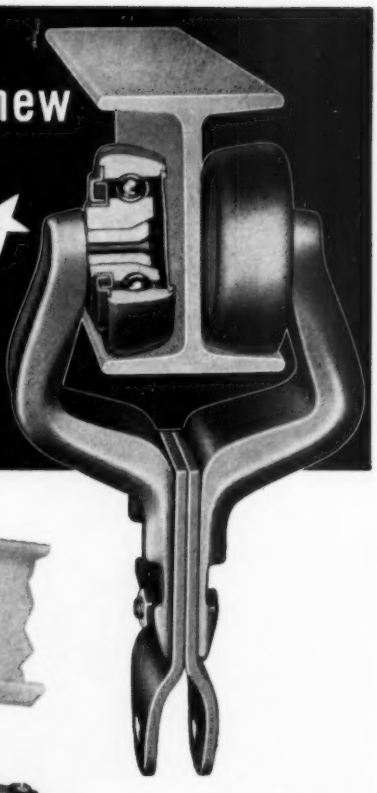
ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

Here are a few of the other jobs the HD-5G and its attachments will handle:

Maintains yards and roads with bulldozer or shovel • Clears snow from parking areas • Moves machinery and other heavy materials with Crane Hook attachment • Spots railroad cars at loading docks • Digs trenches for pipe or foundation footings with Trench Hoe attachment

meet the bright new MATHEWS LOADSTAR

a spectacular performer in the fine trolley field



★ Complete Loadstar assembly with TB-4351 brackets and X-458 chain.

★ No. 4207J Loadstar wheel, cutaway showing felt and steel seal.

★ Here is a completely new trolley conveyer designed to meet the requirements of the most exacting purchaser. A top-quality precision wheel, the No. 4207 Loadstar is the heart of this rugged newcomer to the 4" trolley conveyer field. Five years of research and development by Mathews Engineers are behind this exceptionally fine trolley which is recommended for the overhead conveying job demanding stamina and continuous trouble-free performance. Write for Bulletin LS1, announcing and describing this new trolley.

MATHEWS CONVEYERS

GENERAL OFFICES . . . . . *Mathews Conveyer Company*
ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIVISION . *Mathews Conveyer Company West Coast*
SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . . . . *Mathews Conveyer Company, Ltd.*
PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities

What's your problem?

If it has to do with plant operation . . . production, maintenance, or industrial relations . . . perhaps FACTORY's Editors can help you. Our reader service department will be glad to handle your requests for information.

It's a free service . . . and another reason why more plant operating men pay to read

FACTORY

than any other industrial magazine published.

Big Yard... OR Back Lot...

BELOW . . .
a large auto plant handles large bundles of car frames with their 20-ton Lorain Self-Propelled crane, Model SP-414.

AT RIGHT . . .
bulky steel tanks are stockpiled in the yard of a welding plant by 15-ton Lorain-TL Self-Propelled crane, Model SP-254W.

LORAINS ON RUBBER SAVE MONEY!

• Take a close look at the two photos. Both are yard storage operations of big, bulky materials. One yard has roadways paved with concrete. The other has winding dirt aisles in a weed-grown lot. One company is a giant automobile manufacturer — the second, a small welding plant.

• Mobile, rubber-tire Lorain Self-Propelled cranes are saving time and money for each of these plants, proof that *any* plant can cut costs and handle more materials the Lorain Crane way. Paved yards — or "back lot" — if material must be unloaded, loaded, stored or transported, a rubber-tire Lorain can fit your material handling problem.

• Savings start with men — one man at the controls of a Self-Propelled Lorain does the work of a crew; rubber-tire mobility takes the Lorain all over the yard quickly; air steering and air brakes add to ease of operation and maneuverability; 16 or more front-end lifting attachments handle any size, shape or type of material. Uses are unlimited — and there's a saving with every use!
Ask your local Thew-Lorain Distributor for complete information.

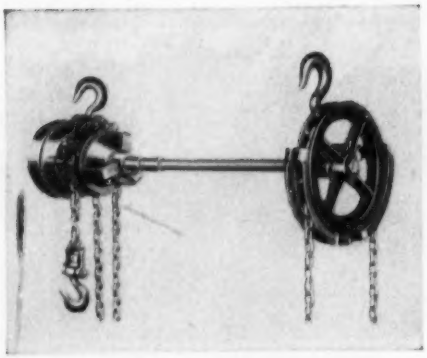
THE THEW SHOVEL CO., LORAIN, OHIO

THEW LORAIN

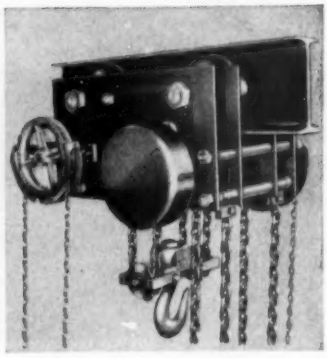
GET "Special"

CHESTER CHAIN HOISTS

FOR SPECIAL HANDLING PROBLEMS



Extended Handwheel Type



Low Headroom Trolley Hoist

...get faster service at Chester!

If you have a special problem in your plant, in handling, lifting, lowering or moving... chances are excellent that there is a Chester Hoist "Special" that will simplify the operation and save you time and money.

For example, the Extended Handwheel Hoist can be efficiently operated from a safe distance in lifting and moving hot, freshly painted or other hard-to-handle loads. Or, if floor to ceiling height in your plant is too limited for standard hoist and trolley equipment, the Low Headroom type with built-in trolley can easily solve that problem.

These, and other special hoists, as well as standard Spur-Geared Hoists and trolleys, in 1½ to 25-ton capacity, are quickly available from the Chester line. Streamlined production often permits deliveries in a fraction of the usually anticipated time. If you can use a Chester Hoist "Special" to facilitate your production, ask your distributor today—or write us for the Chester catalog and tell us your "special" problem.

CHESTER HOIST DIVISION

The National Screw & Mfg. Company, Lisbon, Ohio

National Products — FASTENERS — HODELL CHAINS — CHESTER HOISTS

190

ACTUAL CASES OF

HOW MATERIALS HANDLING PROBLEMS were solved!

ANYONE whose job involves the storing or moving of materials in, through, or about a plant or warehouse will find this book a valuable source of tested materials handling methods. In its 190 cases are many quick-study reviews of actual plant situations, each compressing into terse word and picture form the vital facts—problem factors, methods, equipment, results, etc.—giving a wealth of ideas and practical applications to help you save through better materials handling in large and small plants.

MATERIALS HANDLING CASE BOOK

Edited by LEWIS K. URQUHART, Managing Editor, **and CARROLL W. BOYCE,** Industrial Production Editor, **Factory Management and Maintenance**

440 pages, 8½ x 11, 738 illustrations, $9.50

Each case study fully indexed by kind of equipment used, kind of product handled, and company name.

WITH this case book on hand, you can save a good deal of the time, trouble, and money usually spent in overcoming materials handling obstacles. It takes you logically from case studies covering materials handling in receiving and shipping, machine lines, production, and finishing operations . . . to those covering materials handling on assembly lines, in packaging, storage, and out in the yard. Each case study has been prepared either by the plant executive responsible for materials handling in the company reported on, or by **Factory's** editors. **They are fast-reading, to the point, and authoritative**—the best from recent issues of **Factory Management and Maintenance.** They provide you with the actual practices—with the hard-earned experiences of leaders in the field—that you can quickly adapt and combine to your own particular needs. Use them to do more efficient and economical materials handling.

SEE THIS BOOK 10 DAYS FREE

McGRAW-HILL

McGraw-Hill Book Co., Inc.
330 W. 42nd St.
New York 18, N. Y.

Send me Urquhart and Boyce's **MATERIALS HANDLING CASE BOOK** for 10 days' examination on approval. In 10 days I will remit $8.00, plus few cents for delivery, or return book postpaid. (We pay for delivery if you remit with this coupon; same return privilege.)

(Print)
Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position F-FAC-5-53

This offer applies to U. S. only

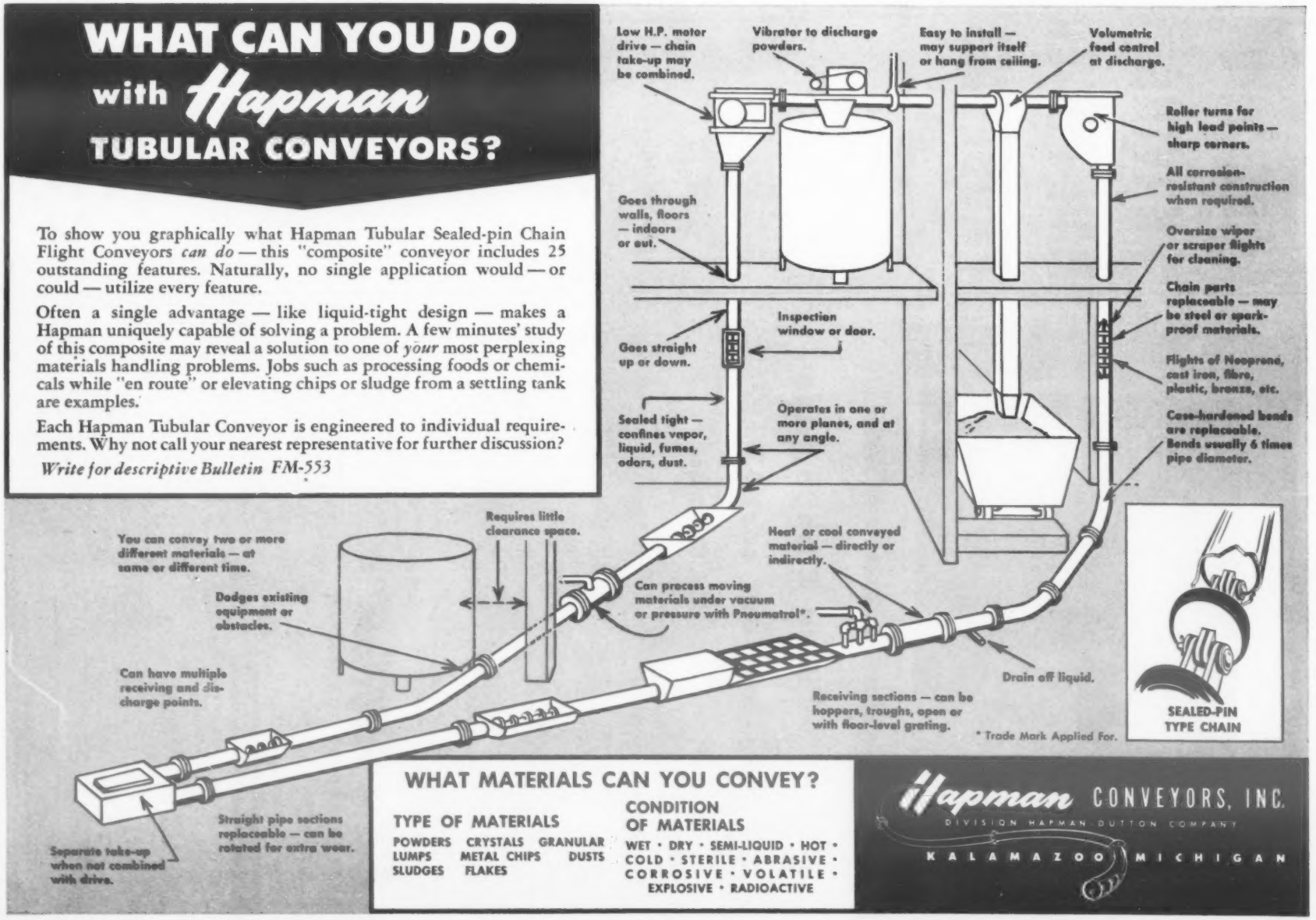
WHAT CAN YOU DO with Hapman TUBULAR CONVEYORS?

To show you graphically what Hapman Tubular Sealed-pin Chain Flight Conveyors *can do* — this "composite" conveyor includes 25 outstanding features. Naturally, no single application would — or could — utilize every feature.

Often a single advantage — like liquid-tight design — makes a Hapman uniquely capable of solving a problem. A few minutes' study of this composite may reveal a solution to one of *your* most perplexing materials handling problems. Jobs such as processing foods or chemicals while "en route" or elevating chips or sludge from a settling tank are examples.

Each Hapman Tubular Conveyor is engineered to individual requirements. Why not call your nearest representative for further discussion?

Write for descriptive Bulletin FM-553


Low H.P. motor drive — chain take-up may be combined.
Vibrator to discharge powders.
Easy to install — may support itself or hang from ceiling.
Volumetric feed control at discharge.
Roller turns for high load points — sharp corners.
All corrosion-resistant construction when required.
Goes through walls, floors — indoors or out.
Oversize wiper or scraper flights for cleaning.
Chain parts replaceable — may be steel or spark-proof materials.
Inspection window or door.
Goes straight up or down.
Flights of Neoprene, cast iron, fibre, plastic, bronze, etc.
Sealed tight — confines vapor, liquid, fumes, odors, dust.
Operates in one or more planes, and at any angle.
Case-hardened bends are replaceable. Bends usually 6 times pipe diameter.
Requires little clearance space.
You can convey two or more different materials — at same or different time.
Heat or cool conveyed material — directly or indirectly.
Dodges existing equipment or obstacles.
Can process moving materials under vacuum or pressure with Pneumatrol*.
Can have multiple receiving and discharge points.
Drain off liquid.
Receiving sections — can be hoppers, troughs, open or with floor-level grating.
* Trade Mark Applied For.
SEALED-PIN TYPE CHAIN
Straight pipe sections replaceable — can be rotated for extra wear.
Separate take-up when not combined with drive.

WHAT MATERIALS CAN YOU CONVEY?

TYPE OF MATERIALS

POWDERS CRYSTALS GRANULAR
LUMPS METAL CHIPS DUSTS
SLUDGES FLAKES

CONDITION OF MATERIALS

WET • DRY • SEMI-LIQUID • HOT • COLD • STERILE • ABRASIVE • CORROSIVE • VOLATILE • EXPLOSIVE • RADIOACTIVE

Hapman CONVEYORS, INC.
DIVISION HAPMAN-DUTTON COMPANY
KALAMAZOO MICHIGAN

case history

CONSISTENTLY SUPERIOR

"Blue Ribbon Tape cut our cost 12½%"

...says Shelby Dinettes, Inc.

"Since we started using Blue Ribbon Tape" writes S. B. Shelby, President of Shelby Dinettes, Inc., "we have cut our taping cost approximately 12½%. We find that Blue Ribbon's sticking ability helps a lot on sealing our large corrugated boxes."

Shelby Dinettes, like many other well known manufacturers, quickly discovered that Blue Ribbon Superstandard Gummed Tape moistens faster . . . forms a stronger permanent bond with one firm sweep of the hand . . . strengthens the carton at the same time it seals out dust and moisture.

Send for booklet showing how you can save money in *your* shipping room with this stronger time and waste-saving *superstandard* tape.

Blue Ribbon
SUPERSTANDARD GUMMED TAPE
A product of **HUDSON PULP & PAPER CORP.**
Dept. 49 505 Park Ave., N.Y. 22, N.Y.

SEND FOR FREE BOOKLET

HUDSON PULP & PAPER CORP.
Dept. 49 505 Park Ave., New York 22, N.Y.

Send me without obligation my copy of your helpful booklet, "How to cut costs in your shipping room."

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

Did you know?

Only Gummed Tape makes cartons so simple to open!

Gummed Tape combines two important safety features for shippers: (1) it gives positive protection to your shipments en route, yet (2) it is simple to open when your shipments safely arrive. Even though Gummed Tape grips like a bulldog, a sharp blade is all your customer needs to open the cartons. He doesn't risk injury to his hands or his newly acquired merchandise in opening the cartons.

Thus Gummed Tape assures both safer transit and safer unpacking. More than ever it pays to seal with Gummed Tape...the only form of closure that does so much for so little.

ARE YOU HAVING MAN-POWER PROBLEMS

at the executive level? An advertisement in FACTORY'S classified section (see pages 210-212) will bring your needs to the attention of the most likely prospects for that vacant position. Men, from the rank of General Foreman to Works Manager read FACTORY regularly.

Check this section now as others seeking connections are advertising for positions.

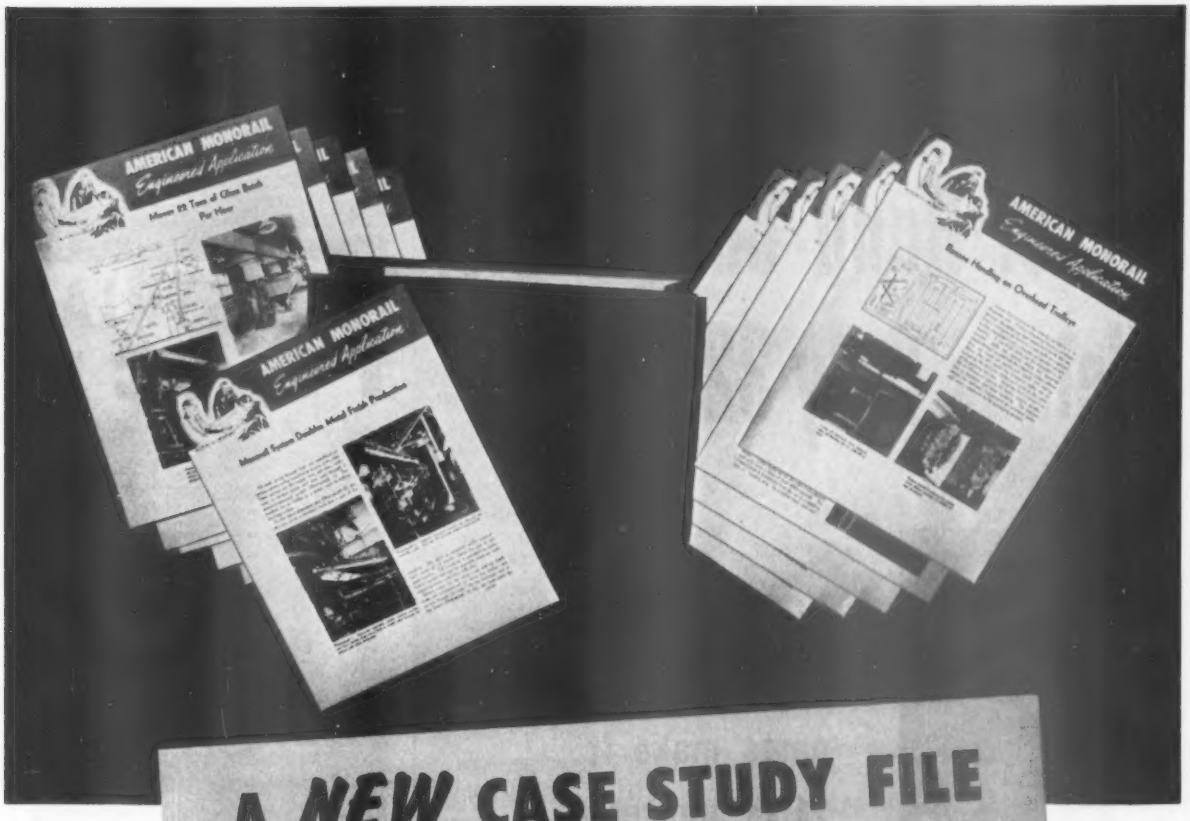
●

Low Rates.

Write—phone or wire to our nearest branch office.

●

FACTORY MANAGEMENT & MAINTENANCE
330 WEST 42nd ST.
NEW YORK 36, N. Y.



A *NEW* CASE STUDY FILE

FOR LOW COST HANDLING

Here's a brand new case study file which contains the first of a continuing series of case studies covering many successful American MonoRail installations.

Check your handling problems against these "Engineered Applications" of American MonoRail systems.

Send coupon for original file. Future studies will reach you as published.

THE AMERICAN MONORAIL COMPANY

13114 ATHENS AVENUE • CLEVELAND 7, OHIO

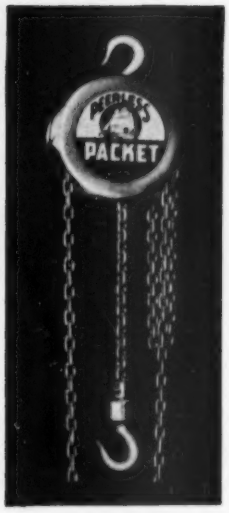
The American MonoRail Co.
13114 Athens Ave., Cleveland 7, Ohio
Please send your Case Study File.

Name_____

Title_____

(Please attach to, or write on your business letterhead)

New 1-Ton Aluminum Packet Hand Chain Hoist Weighs Only 32 Pounds



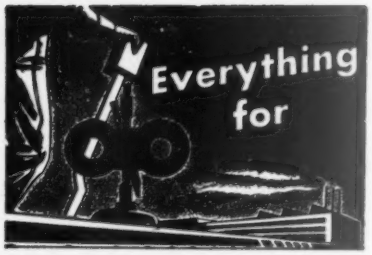
High tensile aluminum alloy parts make it 21 lb. lighter than 1-ton all-steel Packet

This saving in weight is achieved by the use of high tensile aluminum alloy housing, hand chain wheel, hand chain and center frame. Though much lighter in weight, the aluminum Packet retains the drop-forged, heat treated steel hooks; the electrically welded, oval link, heat treated, steel load chain; and the mounting of rotating parts on prelubricated, shielded ball bearings of the all-steel hoist.

To obtain more information on these lightweight, spur geared hoists that are easily carried from place to place and that lift capacity loads smoothly and safely, look in your classified telephone directory under "Hoists" for your nearest Harrington distributor. Or write for Bulletin P-5.

HARRINGTON PEERLESS HOISTS

THE HARRINGTON COMPANY, 1660 W. Callowhill St., Phila. 30, Pa. • *Since 1876*



INDUSTRIAL TRACK

Need Rails—Switches—Frogs—Guard Rails—Track Tools? For best selections, prompt deliveries —*try FOSTER*—shipments from stock in 5 nationwide warehouses.

Call on FOSTER for everything in Industrial Track Equipment and supplies.

RAILS New and Relaying

Send for Track Equipment Catalog # F-5

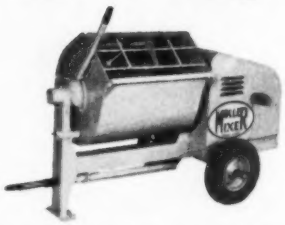
L. B. FOSTER CO.

STEEL SHEET PILING • PIPE • WIRE ROPE

PITTSBURGH 30, PA. NEW YORK 7, N.Y.

CHICAGO 4, ILL. HOUSTON 2, TEX.

Better cores make Better Castings



You can save time and money and make better cores with the Muller new 3½ Cubic Foot Core Sand Mixer. It mixes 250-300 pounds per batch. Better cores mean better castings. This new, labor-saving Core Sand Mixer will "buy itself" out of savings in a short time.

PRICE: $344.00 complete with 1½ H.P. Electric Motor ready to plug in, F.O.B. Metuchen, New Jersey.

This Mixer is also available in 6, 6 to 8, and 9 Cubic Foot sizes.

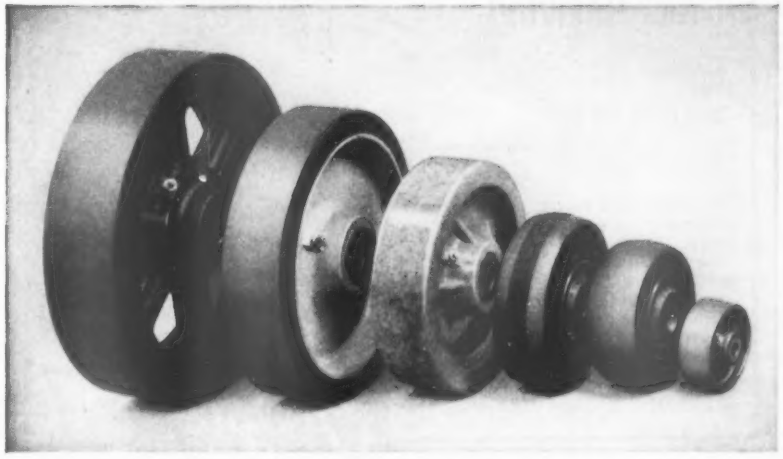
MULLER MACHINERY COMPANY, Inc.

Dept. FM, Metuchen, N. J. Cable: MULMIX

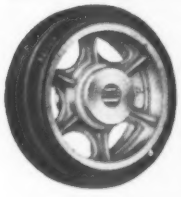
MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

Bassick Industrial Wheels in Varied Types, Sizes Keep Needed Materials on the Move

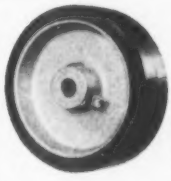


At the bottom of things in any well-planned, fast-moving industrial operation, you'll find a need for Bassick wheels. Available in a wide range of sizes and types to meet any requirement, Bassick Industrial Wheels make it easier to keep materials parts moving on schedule. They save manual effort because they roll easier and faster . . . save money because they're built to quality standards to deliver years of efficient performance.



Oncore

soft rubber tread vulcanized on high-strength semi-steel core. Roller bearings. Widely used wherever large-diameter wheels are required.
Sizes: 5 to 16 in.



Alcore

soft rubber tread vulcanized on special aluminum alloy core for light weight, easier rolling. Ball or roller bearings.
Sizes: 5 to 12 inches.

Canaphin

non-sparking solid wheel molded of macerated canvas and phenolic resin to resist severe shock, acids and extreme heat.
Sizes: 3 to 8 in.

Baco

soft rubber tread molded and bonded by special vulcanization process to solid core. Eliminates tire changes, protects floors. Roller or self-lubricating bearings. Ideal for light and medium service.
Sizes: 1¾ to 8 in.

Atlasite

solid tread molded of special rubber and fiber compound. Carrying capacity equals that of metal wheels, with less floor wear and noise. Resistant to water, oil and most acids. Roller or self-lubricating bearings. Sizes: 1¾ to 8 in.

Biron

precision-made from powdered iron. Oil-impregnated self-lubricating bearings. The highest quality small metal wheels.
Sizes: 1¼ to 3 in.

Great-Grandpappy of The Modern Wheel

Big wheels, little wheels, wheels within wheels all stem from this primitive prototype which was Stone Age man's first attempt at materials-handling. Nobody knows who first discovered that it's easier to pull or push a load than carry it, but he set mankind on the road to progress when he hit upon the idea of using tree-trunks as rollers. Next stage in the history of the wheel was the solid wooden disc, followed around 1800 BC by the spoked wheel.

Still the basic working shape of our civilization, the wheel today is used in practically every kind of materials-handling equipment. Bassick industrial wheels are manufactured in a large variety of materials, sizes and capacities for use either as wheels or in casters. In both assignments, Bassick wheels roll fast and easily, and stand up under the toughest operating conditions.

To help keep your production rolling, call your Bassick industrial distributor for recommendations on the best Bassick wheel for the job. Or write directly to Bassick at the address below.

THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada:
Belleville, Ont.

Bassick
A DIVISION OF
STEWART SW WARNER
MAKING MORE KINDS OF CASTERS . . . MAKING CASTERS DO MORE

B-399

YOU GET EFFICIENT, LOW COST HANDLING

WHEN YOU USE

"STREAMLINER"

CONVEYORS

Shipping platform — Warehouse. —Production and processing departments — Any place at all! You'll be amazed at the effortless operation of "Streamliner" Gravity Roller Conveyors. They cut down unit handling costs, physical strain and fatigue. What's more, they require very little maintenance.

"Streamliner" Gravity Roller Conveyors are "custom-engineered" in several types to meet special as well as standard operations. No doubt you can use such a cost-cutting conveyor in your plant. To get examples of these conveyors in action, write for Bulletin 100.

"Streamliner"

GRAVITY CONVEYORS

POWER CONVEYORS

CONVEYOR SYSTEMS

HARRY J. FERGUSON COMPANY

143 WEST AVE., JENKINTOWN, PENNA.

Shelf Adjustment is 60% faster with Equipto Iron-Grip® Steel Shelving

Exclusive Stud eliminates nuts, bolts and tools

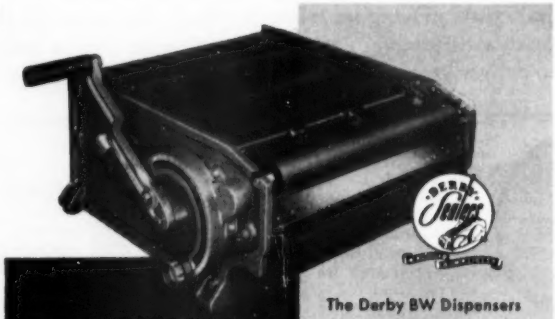
A slope in the keyhole joins with the taper on the stud to form the tightest and strongest of grips. An exclusive Equipto feature.

Iron-Grip Steel Shelving permits instant adjustment of shelves on 1½" centers — entirely from front — without moving the unit. This enables user to quickly and easily adapt the shelving to changing storage needs. And since each shelving unit is complete in itself it may be moved at any time without disturbing remainder of assembly. Matching units may be added as storage needs expand. Equipto Iron-Grip Shelving is immediately available from stock in all sizes, either open or closed, with or without dividers, bin fronts, drawers, or label holders. See your Equipto distributor or write us for free catalog.

® Patent Pending

Equipto AURORA, ILLINOIS

Division of Aurora Equipment Co.
825 Prairie Avenue, Aurora, Illinois
Steel Shelving . . . Parts Bins . . . Drawer Units



Do you use barrier wraps?

Then you need the new

DERBY BW BARRIER WRAP MEASURING DISPENSERS

The Derby BW Dispensers eliminate the slow, messy, expensive Barrier Wrap handling problem and provide a substantial saving in time, labor and material. Large rolls may be converted into the exact widths and lengths desired in one single operation.

Available in models to accommodate 4", 6", 8", 12" and 14" rolls and equipped with Universal Slitter to deliver a variety of desired widths and definite lengths.

For further information write Dept. FMM

DERBY SEALERS, INC. DERBY, CONNECTICUT

Being Completely Satisfied COSTS NO MORE

Satisfying the special needs of industrial users of cranes and hoists has been our business for 30 years. We assume full responsibility from design through manufacturing . . . and even through actual erecting, if desired . . . and warrant every installation. Costs under this co-ordinated plan are competitively low. And the satisfaction of users is proved by the high ratio of repeat orders that we receive.

When you are considering overhead materials handling equipment it is well to consult ABELL-HOWE on Complete Crane Equipment and Service.

Ask for catalog C-124

Complete crane installations Job Engineered and manufactured by ABELL-HOWE are certain to SATISFY . . . INVESTMENTWISE and PERFORMANCEWISE

The Abell-Howe line includes a wide range of motorized and hand operated cranes, runways, monorails, electric hoists, storage racks and accessories.

ABELL-HOWE CO. 53 W. JACKSON BLVD. CHICAGO 4, ILLINOIS

after you've read this magazine

. . . and clipped pertinent ideas, articles and advertisements for reference, *please do not burn or throw it away.*

Here are two sound reasons why:

1) Wastepaper can help to swell the funds of your local Boy Scout Troop, your church or other community organization. It gets a good price these days.

2) Whether in magazine form or not, wastepaper helps to fill the increasing need for paper pulp brought on by the mobilization effort.

Collect it. Give it to your favorite organization. Chances are they have scheduled pickups.

FROM

FOOD SERVICE TO FACTORY...

The AMF Lowerator® Dispenser Principle in Food Service as well as Industry makes work easier and more efficient.

With AMF Industrial Lowerators, materials are always positioned at a convenient working level! *Typical users say . . .*

THE UPJOHN COMPANY, Kalamazoo, Mich.
"Increase output . . . save floor space . . . practically eliminate interruptions to semi-automatic machine operation . . ."

GENERAL ELECTRIC COMPANY, Lynn, Mass.
"Make work easier . . . reduce fatigue . . . improve our plant housekeeping . . ."

AWREY BAKERIES, INC., Detroit, Mich.
"Produce more efficiently with less effort . . ."

Models and sizes to meet your needs

CANTILEVER CLOSED OPEN

Calibrated spring action *automatically* raises or lowers platform as material is removed from or placed on it. Unit has a large vertical storage capacity and whether it is full, half-full or nearly empty, the top layer of material is *always* at convenient working level. AMF Industrial Lowerator Dispensers *are designed to meet your individual requirements.*

Plan to discuss your work levelling problems with us at Booth 1133, MATERIALS HANDLING SHOW, Philadelphia, May 18-22

Mail coupon today—Make Work Easier Tomorrow!

LOWERATOR SALES DEPT., AMERICAN MACHINE & FOUNDRY CO.
485 Fifth Avenue, New York 17, N.Y.
I would like further information about how AMF Industrial Lowerator Dispensers can solve my work levelling and positioning problems.

NAME_____ TITLE_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

(Attach to business letterhead and mail)

AMERICAN MACHINE & FOUNDRY COMPANY • 485 Fifth Ave., New York 17, N.Y.

Perhaps you *too* can slash packaging costs with TAPE-STRAP®

Save time, cut costs, give better protection! These are the end results for literally hundreds of shippers who have switched to Tape-Strap, the dependable, unbelievably strong reinforcing material.

Some save up to 85% in packaging costs. And shipping room operations go faster because Tape-Strap is so easy to apply. It's put on without pressure, requiring no special equipment. And because it has no sharp edges, it's safer, of course.

Tape-Strap has a center layer of resilient, shock-absorbing material that carries embedded lengthwise in it, thousands of tiny filaments. Sandwiching these filaments is tough pliable kraft, with a deep coating of finest, water-soluble gumming that assures instant permanent adhesion.

Don't try to break Tape-Strap. You can't do it. And so you know your packages are safe.

APPROVED—Tape-Strap is approved by the Official, Southern, and Western Classification Committees (Rule 41, Sec. 8 (b), Supp. 29, C.F.C. No. 19), and by Railway Express Agency, Inc. (Rule 18 Packing Requirements—Sealing). Tape-Strap qualifies for military packaging under specification MIL-T-4601 (USAF).

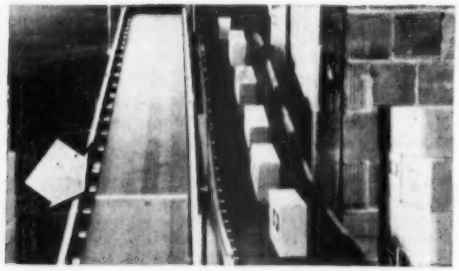
FREE SAMPLE ROLL—Write for free sample roll and test Tape-Strap's astonishing strength on your own containers.

LEADERS IN THEIR LINE

MID-STATES Gummed Paper Company
2511 S. DAMEN AVE., CHICAGO 8, ILLINOIS

BRANCH OFFICES: New York • Boston • Philadelphia • Cleveland • Detroit • St. Louis • Atlanta • Los Angeles

ALLIGATOR
CONVEYOR BELT LACING



in Long Continuous Lengths for Conveyor Belts . . .

- ★ Excellent for Package Conveyors, Portable Loaders, Trenching and Ditching Machines, etc.
- ★ In canneries where corrosion or rust is a problem specify Alligator made of Stainless or Monel.
- ★ For magnetic separators or anti-sparking specify Alligator made of Everdur.
- ★ Separable and smooth on both sides.
- ★ 12 sizes. For belts from 1/16" to 5/8" thick—and *any width.*

Order from Your Supply House. Ask for Bulletin A-60

FLEXIBLE STEEL LACING CO.,4678 Lexington St., Chicago 44, Ill.

JUST A HAMMER TO APPLY IT

IF you change your address,

please be sure to let us know promptly. It takes time to correct the stencil addressing plate. And we don't want you to miss copies of FACTORY.

Also . . . . . .

be sure to give us *both*

(1) your OLD address
and
(2) your NEW address.

We need them *both* to make the the change.

FACTORY
Management and Maintenance
330 W. 42d St., New York 18, N.Y.

A Message to Capable Men Who Are Still Earning Under $10,000

Here Are Some Surprising Facts about the Great Demand for High-Salaried Executives Today — and What You Can Do to "Break Into" the $12,000 to $20,000 Bracket

AMAZING as it may seem, a serious shortage of high-salaried executives exists in every branch of business and industry today. You don't have to look further than the want-ad columns to know that the really big jobs go begging. Openings exist right now for high-calibre executives who can command a salary of $12,000 . . . $15,000 . . . $20,000—and more.

WHY the Big Jobs Go Begging

Employers are on the constant look-out for well-rounded men who show a potential for handling the big jobs. They're eager to invest in men who know the methods used by others to increase profits—men who can make money for them!

Such men are becoming hard to find. Why? The acute shortage has been variously explained by the war years, the rapid expansion of industry, the tendency to specialize. The important thing is not why the shortage exists but WHAT you can do about it, and HOW you can qualify for the great opportunities that exist in business today.

As one of the foremost business consultants in the U. S. and the head of a large accounting firm, J. K. Lasser works with some of the nation's leading corporations. He has seen at first hand the scarcity of qualified men for high-salaried jobs. Why, Mr. Lasser asked, are there so many openings at the top—and so many men stymied in the $5,000 to $10,000 a year bracket?

The One Ingredient That Qualifies You for a Top-Salary Job

To find the answer, Mr. Lasser went directly to the heads of companies in many fields. Consistently he heard the same answer: the one thing men in the middle brackets need to make the high-salary grade is—a general, well-rounded knowledge of business procedure. "Give me a man with a basic knowledge of accounting, marketing, employee relations and taxation," one employer remarked, "and I'll lead him by the hand to a $20,000 office!"

J. K. LASSER

Featured in FORTUNE MAGAZINE as one of the nation's foremost authorities on business and taxes. Mr. Lasser is head of one of the largest accounting firms in the United States and Adjunct Professor and Chairman of the Institute on Federal Taxation at New York University.

This simple answer gave Mr. Lasser an idea for a brand-new plan that would literally lead men out of the $5,000-$10,000 plateau and into the top jobs. He asked the foremost men in every field to reveal working methods that have brought success in marketing, public relations, accounting, budgeting, insurance, government regulations, taxation, and the "know-how" in every business procedure for top-level management.

Mr. Lasser consulted only top men, such as business analyst Roy A. Foulke, Vice President, Dun and Bradstreet; marketing expert Marion Harper, Sr.; twenty executives nationally known for their successful methods. Then he simplified and "boiled down" this wealth of knowledge and experience into J. K. Lasser's Executive Course in Profitable Business Management—providing the all-important ingredient needed to boost men into the $10,000-plus bracket!

What You Can Learn from These Successful Executives

Lasser's Executive Course makes it possible for you to view each departmental operation from the top down, with an expert as your guide. You learn to talk, think, and plan with the kind of well-rounded authority expected of top-management.

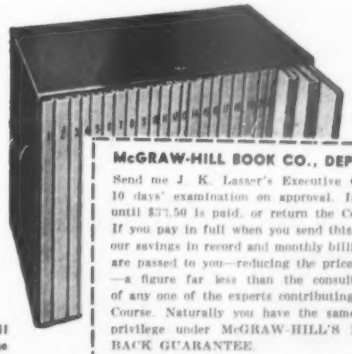
You learn streamlined methods of distribution; how to run a cost system; how to design systems for internal control of business. Even hardboiled employers will be impressed by your knowledge of controlling operations through budgeting; how to avoid business frauds; and how to cut paper work in half. Your knowledge of new marketing methods, successful tax planning, and effective management under today's government controls can save and make money for any employer.

Are You READY for Advancement?

If you're not *sure* of your own advancement, send for Lasser's Course right away. By looking at the whole Course—noting the ground covered, the fact-filled treatment, Lasser's clear, informative style—you can quickly see how this Course can prepare *you* for advancement—back you up with the best ideas of 21 leading business experts.

Take the simple step of dropping the coupon in the mail today. No money down—no salesman will call—you merely agree to send your first installment or return the books, in 10 days. Send the coupon now—it may turn out to be one of the most advantageous steps you ever took.

NOTE TO EMPLOYERS: Mr. Lasser's new course is designed to help solve your problems in readying men for top-level openings in your organization. Send us the names and addresses of men working for you who merely need more background in sound business procedures to qualify them for bigger jobs. We will gladly mail a booklet to them, fully describing the course, without charge or obligation to you.



See all 24 vols. — Mail this FREE EXAMINATION COUPON

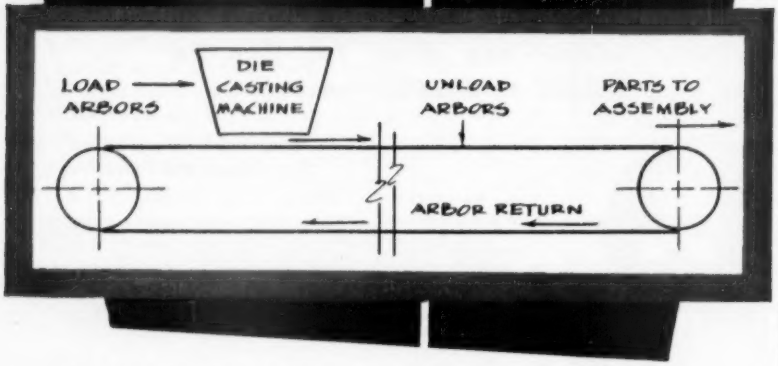
McGRAW-HILL BOOK CO., DEPT. FAC-10, 327 W. 41 ST., N.Y.C. 36

Send me J. K. Lasser's Executive Course in Profitable Business Management, 24 volumes, for 10 days' examination on approval. In 10 days I will send $3.50, and $5.00 monthly thereafter until $77.50 is paid, or return the Course postpaid.

If you pay in full when you send this coupon, our savings in record and monthly billing costs are passed to you—reducing the price to $30. —a figure far less than the consulting fee of any one of the experts contributing to this Course. Naturally you have the same return privilege under McGRAW-HILL'S MONEY BACK GUARANTEE.

(Print)
Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position F-FAC-5-53

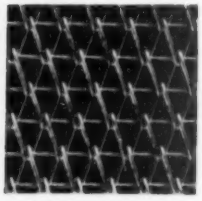
This CAMBRIDGE WIRE MESH BELT LEADS A DOUBLE LIFE



Here's a customer who gets double use from his Cambridge wire mesh conveyor belt. He uses the top side of the belt to carry loaded arbors from the diecasting machine . . . *uses the bottom side to carry empty arbors back to the machine for re-use.* Savings in equipment! Savings in floor space! Savings in handling and time!

Room air circulates freely through the open mesh of the belt to cool the castings. Hot castings cannot harm the all-metal belt. The moving belt feeds parts to the subsequent assembly line at a constant rate of speed.

Even if you're not making diecastings, Cambridge wire mesh conveyor belts can help do many jobs in your plant . . . heat treating, brazing, sintering, pickling, quenching, to name just a few, They can be woven from any metal or alloy, thus can be used under even the most corrosive conditions. They can be fabricated in a wide variety of open or closed meshes, thus can be used for handling small or large parts. And, of course, Cambridge belts are made to any length or width.



HERE'S A TYPICAL CAMBRIDGE SPECIMEN . . . Rod-Reinforced. This particular weave is widely used in continuous heat treating furnaces.

For complete information on how Cambridge wire mesh belts can help you combine movement with processing, call in your Cambridge Field Engineer. He's listed under "Belting-Mechanical" in your classified telephone book. Or, write direct for this NEW, WIRE MESH BELT CATALOG. IT'S FREE! Gives conveyor and conveyor belt design and installation data, metallurgical tables, other useful information.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

Department E
Cambridge 5, Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

McGRAW-HILL TECHNICAL WRITING SERVICE

Writing

Whether you need an instruction book or service manual to accompany your equipment written to government specifications . . . or product catalogs . . . or training booklets . . . or industrial literature . . . our writing staff can do the job for you. It will do the research, planning, writing, and organizing to satisfy your requirements.

Illustrating

For government publications or industrial literature, our Art department can meet your specifications, or those of the government agency, for isometrics, exploded views, cutaway views, retouched halftone copy, rendering, lettering, or any other type of art work. It can design to standardized format or present industrial visuals of compelling appeal.

Editing

The editors of our staff are thoroughly familiar with government publication specifications. In addition to being technical editors, they are also experienced in rewriting and organizing rough manuscript, or in revising published material. Many have taught or have been trained in teaching and are, therefore, able to recommend or inject proper pedagogical presentation of material.

Printing

Our printing, binding, and paper resources are among the best in the country. Every type of reproduction is available . . . offset, letterpress, multigraph, or even mimeograph. We can handle a complete printing job or, in the case of offset, furnish repro copy when other facilities must be used.

Save money and time . . . let our staff be your staff for technical and business publications. Write for our brochure or ask our representative to call.

Technical Writing Service

McGRAW-HILL BOOK CO., INC.
330 West 42 Street
New York 36, N. Y.

All business is specialized

. . . and nothing specializes
on <u>your</u> business
like your business paper

This bright bird *specializes*. He picks out the cold customer who's a hot prospect. And it *pays!* Specializing pays in your business too . . . most of all when you're looking for data on new products, new ways of doing business. That's why this business paper of yours is so vital. It specializes on your business—scouts for facts you need to solve your specific problems. Editorial pages and ads *both* bring you a heap of help. Like all the best informed people in your field, you'll find you always keep a step ahead when you read . . . clip . . . use every issue, to do more business better.

This business paper in your hand has a plus for you, because it's a member of the Associated Business Publications. It's a *paid* circulation paper that must *earn* its readership by its quality . . . And it's one of a leadership group of business papers that work together to add new values, new usefulness, new ways to make the time you give to your business paper still more profitable time.

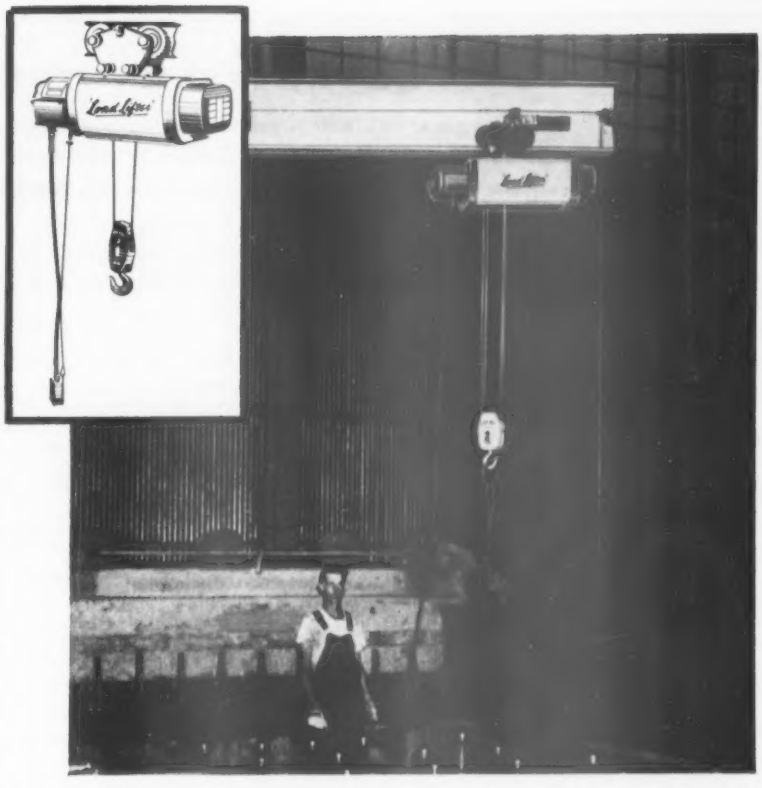
NEXT ISSUE you'll be reading about . . .

"DYNAMIC BALANCING"

You'll get the facts . . . simply and clearly . . . in June

FACTORY

One of a series of ads prepared by
THE ASSOCIATED BUSINESS PUBLICATIONS



SAVES WORK AND WORKER

'Load Lifter'® ELECTRIC HOIST

MAKE LIGHT WORK **of heavy lifting in your plant. Use the "Series 700" 'Load Lifter' to speed defense and civilian output. Push-button operation saves time and effort, wards off worker fatigue, keeps machines busy. You save on every lift.**

FAST HOISTING IS YOURS **when the 'Load Lifter' is installed. The 1-ton size lifts the full load one foot a second. One hand is always free to guide the load into position. Quick stops and starts make spotting easy, accurate.**

COMPLETE SAFETY **for man, load, and hoist is engineered into every 'Load Lifter'. Steel suspension, heat-treated helical gearing, synchronized load and motor brakes, safety type lower block, and only 24 volts at the push button are your assurance of all-around protection.**

LONG-LIFE ECONOMY **in heavy-duty service is the record of the 'Load Lifter'. Built with precision and a minimum number of parts, designed for one-point lubrication and equipped with ball bearings, the 'Load Lifter' is the best electric hoist investment you can make. Capacities: ½-ton and up. Single and two-speed control. Ask your nearby "Shaw-Box" Distributor for details or write for Bulletin No. 399.**

'Load Lifter'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' Industrial Instruments, and Aircraft Products.

B-405

ADVERTISERS' INDEX

The May issue of FACTORY is published in two parts, each with separate editorial and advertising content. The advertisers in Part II are indexed below. For complete Index to Advertisements in both parts, see pages 214 and 215 in Part I.

Abell-Howe Company B-401
Acme Steel Company B-43, B-390
Adam Electric Co., Frank B-244
Ainsworth Mfg. Co. B-304, B-305
Alan Wood Steel Company B-76
Allen Ventilator Division, Production Planning Company B-180
Allis-Chalmers Mfg. Co. B-225, B-226, B-227, B-228
Allis-Chalmers Mfg. Co., Tractor Division B-391
Alvey-Ferguson Company B-330
Alsynite Company of America B-52
Aluminum Company of America B-173
American Abrasive Metals Co. B-48
American Air Filter Company B-102, B-103
American Blower Corporation B-169
American Bitumuls & Asphalt Co. B-134
American Marietta Co., Valdura Division B-120
American Monorail Company B-397
Anaconda Wire & Cable Company B-255
Anchor Fence Division, Anchor Post Products, Inc. B-46
Anderson Company, V. D. B-150
Angier Corporation B-387
Ansul Chemical Company B-116, B-158
Aro Equipment Corporation B-323
"Automatic Sprinkler Corporation of America B-61
Automatic Transportation Co. B-306, B-307
Automotive Rubber Company, Inc. B-166

Babcock & Wilcox Company B-143
Baker-Raulang Company B-372, B-373
Baldwin-Hill Company B-172
Barrett Cravens Company B-380
Bassick Company B-399
Bausch & Lomb Optical Co. B-181
Benjamin Electric Mfg. Co. ..... 4th Cov., Pt. II
Bituminous Coal Institute B-119
Bowers Battery & Spark Plug Co. B-344
Bowers & Son, Inc., Lewis C. B-70
Bradley Washfountain Co. B-113
Brulé Incinerators B-122
Bulldog Electric Products Co. B-254
Buschman Co., Inc., E. W. B-356
Bush Mfg. Co. B-188
Bussman Mfg. Co. B-246, B-247
Butler Mfg. Co., Inc., B. B. B-342

Cable-Link Corporation B-322
Cambridge Company B-276
Cambridge Wire Cloth Co. B-404
Certified Equipment Manufacturers B-127, B-167
Chelsea Fan & Blower Co., Inc. B-162
Chester Hoist Division, National Screw & Mfg. Co. B-394
Chicago Hardware Foundry Co. B-142
Chisholm Moore Corporation B-378
Clarage Fan Company B-108, B-109
Clark Equipment Company, Industrial Truck Division B-365
Cleveland Crane & Engineering Co., Cleveland Tramrail Division B-310, B-311
Coffing Hoist Company B-337
Coles Cranes, Inc. B-338
Continental Steel Corporation B-54
Conveyor Specialty Company B-334
Cooper Alloy Foundry Co. B-112
Cooper Bessemer Corporation B-189
Corrulux Division, Libbey-Owens-Ford Glass Co. B-55
C-O-Two Fire Equipment Company B-72

Darnell Corporation, Ltd. B-364
Day Company B-148
Day-Brite Lighting Co. B-147
De Laval Steam Turbine Co. B-197
Derby Sealers, Inc. B-400
Detroit Steel Products Company B-29, B-30, B-31, B-32
Doepke Mfg. Co., Inc., Chas. Wm. B-339
du Pont de Nemours & Co., Inc., Finishes Division ..... Ins. facing B-112
Dracco Corporation ..... Ins. facing B-129, B-388
Dravo Corporation B-183
Dunham Company, C. A. B-165
Duro-Test Company B-163

Eagle Picher Sales Company B-160
Ebasco Services, Inc. B-61
Ediphone Division, Thos. A. Edison, Inc. B-241
Edison Storage Battery Div., Thos. A. Edison, Inc. B-359
Electric Controller & Mfg. Co. B-271
Electric Storage Battery Co. B-316, B-317
Electromode Corporation B-116
Elwell-Parker Electric Co. B-318, B-319
Equipment Manufacturing, Inc. B-322
Equipto, Division of Aurora Equipment Company B-400
Euclid Crane & Hoist Corp. B-363
Everseal Manufacturing Co. B-162

Feedrail Corporation B-229
Fenwal, Inc. B-265
Ferguson Co., Harry J. B-400
Finnell System, Inc. B-117
Fireye Corporation B-26, B-27
Flexible Steel Lacing Co. B-402
Flintkote Company B-75
Foster Co., L. B. B-398

General Box Company B-336
General Cable Corporation B-248, B-249
General Electric Co., Air Conditioning Div. B-179
General Electric Co., Apparatus Dept. B-57, B-151, B-232, B-233, B-234, B-235, B-236, B-237, B-238, B-239, B-240, B-320, B-321, B-350
General Electric Co., Construction Materials Div. B-215
General Electric Co., Lamp Dept. B-135
General Electric Co., 2-Way Radio B-369
Goodrich Company, B. F. B-357
Gould National Batteries, Inc. B-325
Graybar Electric Company B-257
Grinnell Company, Inc. B-63
Gummed Products Company B-355

Hansen Manufacturing Company B-155
Hapman Conveyors, Inc. B-395
Harnischfeger Corp. B-326, B-327
Harrington Co. B-398
Hewitt-Robins, Inc. B-370, B-371
Hough Co., Frank G. ..... 3rd Cov., Pt. II
Hudson Pulp & Paper Corp. B-396
Hyster Company B-343

Ingersoll Rand Company B-367
Inland Steel Company ..... Insert B-32
International Steel Company B-56
ITE Circuit Breaker Company ..... Insert B-256

Jackson & Church Co. B-115
Jefferson Electric Company B-272
Jenkins Bros. B-191
Jeffrey Mfg. Co. B-360, B-361
Johns-Manville Corporation B-58, B-69, B-73, B-74
Jones & Laughlin Steel Corp. B-64
Joy Manufacturing Co. B-129

Kaiser Aluminum & Chemical Sales, Inc. B-65
Kalman Floor Co., Inc. 2nd Cov., Pt. II
Keasbey & Mattison Co. B-77
Kellogg Switchboard & Supply Co. B-275
Kentile, Inc. B-71
Kex National Service B-132
Kidde & Co., Walter B-44
Kinnear Mfg. Co. B-42
Kold-Hold Mfg. Co. B-130
Koppers Company B-193
Korfund Company, Inc. B-196
Kwik-Mix Company B-328

Legge Company, Inc., Walter G. B-74
Lewis-Shepard Company B-302, B-303
Linde Air Products Company B-121
Link Belt Company B-377
Logan Company B-358
Lowerator Sales Dept., American Machine & Foundry Co. B-401
Lustra Corporation B-194

Mahon Company, R. C. B-41
Manhattan Rubber Div., Raybestos Manhattan, Inc. B-329
Manning, Maxwell & Moore, Inc. B-405
Maple Flooring Manufacturers Assn. B-54
Marlow Pumps B-184
Master Builders Co. B-49
Master Bronze Powder Co. B-190
Master Lock Company B-52
Mathews Conveyor Company B-392
McGraw & Company, F. H. B-53
McGraw-Hill Book Co. B-186, B-194, B-394, B-403
Mechanical Handling Systems, Inc. B-332, B-333
Mercury Manufacturing Co. B-382
Mid-States Gummed Paper Co. B-402
Mills Company B-51
Minnesota Mining & Mfg. Co. B-195, B-362
Mississippi Glass Co. B-62
Mobilift Corporation B-385
Moloney Electric Company B-230, B-231
Monarch Rubber Company B-331
Muller Machinery Co. B-398
Multi-Amp Corporation B-270
Multi-Clean Products, Inc. B-144

National Electric Products Corp. Ins. B-240
Nelson Division, Herman B-172
Norton Company B-28

Ohio Brass Company B-157
Oil Dri Corporation B-174
Oster Manufacturing Co. B-175
Owens-Corning Fiberglas Corp. B-242, B-243

Pangborn Corporation B-164, B-184
Parker Appliance Company B-110, B-111
Patent Scaffolding Co., Inc. B-162
Pioneer Rubber Company B-172
Pittsburgh Corning Corp. B-34, B-35
Pittsburgh Plate Glass Co., Brush Div. B-188
Pittsburgh Plate Glas Co., Paints Div. Ins. facing B-128
Plymouth Rubber Company, Inc. B-275
Powell Pressed Steel Co. B-312, B-313
Powers Regulator Co. B-104, B-105
Pulverizing Machinery Co. B-379

Randolph Laboratories, Inc. B-146
Ranney Method Water Supplies, Inc. B-154
Rapids Standard Company, Inc. B-408
Read Standard Corporation B-176
Ready-Power Company B-346
Republic Rubber Division, Lee Rubber & Tire Corporation B-376
Republic Steel Corporation B-384
Resolite Corporation B-70
Reynolds Metals Company B-67, B-149
Reznor Manufacturing Co. B-128
Ridge Tool Company B-168
Richards-Wilcox B-389
RLM Standards Institute B-171
Rockbestos Products Corporation B-273
Robertson Company, H. H. B-126
Roeblings Sons Company, John A. B-277, B-347
Rome Cable Company B-267, B-274
Roots-Connersville Blower Div., Dresser Industries, Inc. B-138
Roper Corporation, Geo. D. B-156
Ross Carrier Company B-352
Rotary Lift Company B-314, B-315
Ruberoid Company B-33
Rust-Oleum Corporation B-161

Sanymetal Products Co., Inc. B-47
Schramm, Inc. B-106, B-107
Scott Paper Company B-178
Servel, Inc. B-133
Shell Oil Company B-335
Shepard Niles Crane & Hoist Corp. B-368
Signal Engineering & Mfg. Co. B-276
Sly Mfg. Co., W. W. B-139
Smithcraft Lighting Division B-123
Solar Sturges Mfg. Div., Pressed Steel Car Company, Inc. B-136
Spang-Chalfant Division, National Supply Company B-131
Speedi-Dri Corporation B-124
Spencer Turbine Co. B-170
Standard Conveyor Company B-366
Standard Oil of Indiana B-36, B-37
Standard Pressed Steel Co. B-68
Stanley Works, Inc. Steel Strapping Division B-381
State of New York Department of Commerce B-66
Steelcraft Manufacturing Co. B-45
Stephens-Adamson Mfg. Co., Engineering Div. B-355
Stewart Iron Works Co., Inc. B-70
Surface Combustion Corp. B-142, B-159
Sylvania Electric Products Co. Ins. B-113

Taylor Co., Halsey W. B-134
Technical Writing Service B-404
TelAutograph Corporation B-268, B-269
Tennant Co., G. H. B-118
Thew Shovel Co. B-393
Thompson Electric Company B-180
Thread-Ezy Mfg. Co. B-180
Tile-Tex Div., Flintkote Company B-60
Toledo Scale Company B-374
Towmotor Corporation B-341
Trane Company B-152, B-153
Tremco Manufacturing Company B-177
Tropical Paint & Oil Company B-111
Trumbull Dept., General Electric Company B-252, B-253

Union Metal Mfg. Co. B-324
Union Steel Products Company B-308, B-309
Unistrut Products Co. B-125, B-353
U.S. Air Conditioning Corp. B-154
U.S. Hoffman Machinery Corp. B-190
U.S. Rubber Company B-185
U.S. Rubbzer Company, Electrical Wire & Cable Dept. B-224
U.S. Safety Service Co. B-154
U.S. Steel Corporation B-38, B-39, B-59

Vacu-Blast Company B-340
Vestal Incorporated B-114

Wagner Electric Company B-250, B-251
Wayne Crane Div., American Steel Dredge Co., Inc. B-384
Wayne Pump Company B-386
Webb Company, Jervis B. B-345
West Disinfecting Company B-137
Westinghouse Electric Corp. B-140, B-141, B-258, B-259, B-261, B-262, B-263, B-264, B-265, B-383
Westinghouse Electric Corp. Electronic Tube Dept. B-260
Westinghouse Electric Corp. Lamp Div. B-187
Westinghouse Electric Corp. Sturtevant Div. B-145
Wheeler Insulated Wire Co., Inc. B-266
Wheeling Corrugating Co. B-50
Wing Mfg. Co., L. J. B-186
Wire Rope Sling Dept., American Chain & Cable Co. B-375
Wright Hoist Division, American Chain & Cable Co. B-351

Yale & Towne Mfg. Co. B-348, B-349

YOU'LL PROFIT FROM THE BEST

of this cost-cutting experience

The rough, tough schools of competition and experience are great teachers.

That's why Rapistan now releases a vast library of fast-reading, illustrated data on how other companies have changed materials handling problems into profits. Many of them are in your own field.

These field reports are from every corner of the country. Each report gives you a tested and successful handling improvement idea that could save you thousands of dollars yearly. You'll find many suggestions on how to use your present equipment in new ways.

Our surveys show that of those reports distributed, 75% have been kept by management men for future action. At least 20% of these reports have inspired immediate improvements in handling methods.

Rapistan invites you to share its long cost-cutting experience by indicating which of these factual reports will be helpful to you. Check the list on this page or just write today on your letterhead.

Rapistan conveying equipment is right for each job . . . single units, lines or engineered systems for specific needs. Rapistan equipment is better 3 ways in flexibility, quality and exceptional value.

Rapistan®

BETTER CONVEYING EQUIPMENT

Representatives in Principal Cities

CONVEYORS • INDUSTRIAL CASTERS • WHEEL-EZY® TRUCKS

YOURS FOR THE ASKING!

Complete Rapistan Field Reports on how materials handling problems similar to yours have been successfully solved by and for leaders in your own field. Each report details the problem involved, its solution, and results obtained. Below is a partial listing of available reports. No charge. No obligation.

Please check your business classification:

☐ Manufacturing ☐ Agricultural ☐ Wholesale ☐ Retail

Check reports below which will be of greatest benefit to you:

- ☐ Aircraft Parts
- ☐ Auto Supplies
- ☐ Beverages
- ☐ Building Supplies
- ☐ Canneries
- ☐ Chemicals
- ☐ Cosmetics
- ☐ Dairy Products
- ☐ Fabricated Metals
- ☐ Floor Coverings
- ☐ Food Products
- ☐ Freight Terminals
- ☐ Fruits, Vegetables
- ☐ Furniture
- ☐ Grain and Feeds
- ☐ Grain Milling
- ☐ Grocery Store
- ☐ Heating Equipment
- ☐ Household Appliances
- ☐ Laundry Services
- ☐ Leather Products
- ☐ Machine Parts
- ☐ Magazines, Newspapers
- ☐ Meat Packing
- ☐ Metal Stamping
- ☐ Paint Products
- ☐ Paper and Publishing
- ☐ Pharmaceuticals
- ☐ Power Tools
- ☐ Sugar Refining
- ☐ Tobacco Products
- ☐ Warehousing
- ☐ Waste Materials
- ☐ Wood Products

There are many other Rapistan Field Reports. If your business is not listed, please indicate your special needs below:

THE RAPIDS-STANDARD COMPANY, INC.
138 Rapistan Building, Grand Rapids 2, Michigan

NAME _____

COMPANY NAME _____

STREET ADDRESS _____

CITY _____ ZONE _____ STATE _____

HERE'S A HANDY POSTCARD THAT WILL HELP YOU—

GET MORE INFORMATION

How to use this Reader Service card . . .

The bottom of this page is a postcard—you'll note that the page has been perforated so that you can tear it out easily. And on the next right hand page you'll find an exact duplicate of this postcard that you can pass along to somebody else.

These postcards make it easy for you to get more information on anything that's advertised in FACTORY or listed in FACTORY's New Catalog Section.

New Catalog Section: The "Better Plants" Section—Part II of your May FACTORY—is subdivided into four separate and complete units. There is a New Catalog Section in each unit—Buildings & Grounds starts on page B-40, Plant Services on page B-108, Electrical Distribution on page B-266, and Materials Handling on page B-324. Look over the descriptions of the various catalogs. You'll note that each catalog is identified by a number. Then look *in Part I* at "PEP" which begins on page 168 and "POP" on page 172. In the New Catalog Section of the postcard, circle the number corresponding to the number of the catalog you want. You'll get it—without obligation—direct from the manufacturer.

Advertising Section: Look at the advertisements in *BOTH SECTIONS* of May FACTORY. The postcard has numbers corresponding to page numbers. Circle the number on the postcard corresponding to the page number containing the advertisement you're interested in. *The letters L, R, T, B locate advertisements on the page: left, right, top, or bottom.*

Then be sure: Fill out your address in the space provided, tear out the card and drop it in the mail.

FACTORY: Send me more information about . . .

. . . Items in the CATALOG SERVICE SECTION as circled below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154
155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176
177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286
287	288	289	290	291	292	293	294	295	296	297											

. . . Items advertised on the pages circled below:

1	4	5	6	7	8	9	10	11	12	13	14	15	16	16a	16b	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	89	91	93	95	97	99	102	103	104	105	106	107	108	109	110	111
112	112a	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143	144	144a	145	147	148	149	150	151	152	153	154
155	156	157	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177
178	179	180	181	182	183	184T	184B	185	186	187	188L	188R	189	190T	190L	190R	191	192L	192R	193	194L
194R	195	196	197	198	199	200L	200T	200B	201	202	203	204L	204R	205	206	207	209	210	216	2nd cover	
3rd cover	4th cover																				

B26	B27	B28	B29	B30	B31	B32	B32a	B33	B34	B35	B36	B37	B38	B39	B41	B42	B43	B44		
B45	B46	B47	B48	B49	B50	B51	B52L	B52R	B53	B54T	B54B	B55	B56	B57	B58	B59	B60	B61L		
B61R	B62	B63	B64	B65	B66	B67	B68	B69	B70T	B70L	B70R	B71	B72	B73	B74L	B74R	B75	B76		
B77	B102	B103	B104	B105	B106	B107	B108	B109	B110	B111L	B111R	B112L	B112R	B112a	B112b	B113	B114	B115		
B116T	B116B	B117	B118	B119	B120	B121	B122	B123	B124	B125	B126	B127	B128	B128a	B128b	B129	B130	B131		
B132	B133	B134T	B134B	B135	B136	B137	B138	B139	B140	B141	B142L	B142R	B143	B144	B145	B146	B147	B148		
B149	B150	B151	B152	B153	B154L	B154T	B154B	B155	B156	B157	B158	B159	B160	B161	B162L	B162T	B162B	B163		
B164	B165	B166	B167	B168	B169	B170	B171	B172L	B172T	B172B	B173	B174	B175	B176	B177	B178	B179	B180L		
B180T	B180B	B181	B182	B183	B184L	B184R	B185	B186L	B186R	B187	B188L	B188R	B189	B190L	B190T	B191	B193	B194L		
B194R	B195	B196L	B197	B224	B225	B226	B227	B228	B229	B230	B231	B232	B233	B234	B235	B236	B237	B238		
B239	B240	B240a	B241	B242	B243	B244	B245	B246	B247	B248	B249	B250	B251	B252	B253	B254	B255	B256		
B256a	B257	B258	B259	B260	B261	B262	B263	B264	B265	B266	B267	B268	B269	B270	B271	B272	B273	B274		
B275T	B275B	B276T	B276B	B277	B302	B303	B304	B305	B306	B307	B308	B309	B310	B311	B312	B313	B314	B315		
B316	B317	B318	B319	B320	B321	B322L	B322R	B323	B324	B325	B326	B327	B328	B329	B330	B331	B332	B333		
B334	B335	B336	B337	B338	B339	B340	B341	B342	B343	B344	B345	B346	B347	B348	B349	B350	B351	B352		
B353	B354	B355	B356	B357	B358	B359	B360	B361	B362	B363	B364	B365	B366	B367	B368	B369	B370	B371		
B372	B373	B374	B375	B376	B377	B378	B379	B380	B381	B382	B383	B384L	B384R	B385	B386	B387	B388	B389		
B390	B391	B392	B393	B394L	B394R	B395	B396	B397	B398L	B398T	B398B	B399	B400L	B400T	B400B	B401L	B401R	B402T		
B402B	B403	B404L	B404R	B405	B408	2nd cover	3rd cover	4th cover												

TAKE ANOTHER LOOK...

. . . at the advertising in this FACTORY issue

. . . at FACTORY's Catalog Service Section

. . . and then check off on this handy postcard the items you want to know more about.

It's an easy way to get all the information you need on any subject you are interested in—you can build your own data file. And you can do it without cost.

Every month in FACTORY you can use the free Catalog Service Section to get useful literature. And every month in FACTORY's advertising pages, leading manufacturers show you new ways, better ways to cut costs, boost production.

NAME .....

POSITION .....

COMPANY .....

ADDRESS .....

CITY & STATE .....

FIRST CLASS
PERMIT No. 64
(Sec. 34.9, P. L. & R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD

No Postage Stamp Necessary If Mailed In The United States

4¢ — POSTAGE WILL BE PAID BY —

McGRAW-HILL PUBLISHING CO., Inc.
Reader Service Department

FACTORY Management & Maintenance

330 WEST 42nd STREET

NEW YORK 36, N. Y.

TWO POSTCARDS TO HELP YOU—

GET MORE INFORMATION

Two postcards—one for you and one to pass along.

See the instructions for use on the previous right hand page.

FACTORY: Send me more information about . . .

. . . items in the CATALOG SERVICE SECTION as circled below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154
155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176
177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276	279	280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297													

. . . items advertised on the pages circled below:

1	4	5	6	7	8	9	10	11	12	13	14	15	16	16a	16b	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	89	91	93	95	97	99	102	103	104	105	106	107	108	109	110	111
112	112a	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143	144	144a	145	147	148	149	150	151	152	153	154
155	156	157	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177
178	179	180	181	182	183	184T	184B	185	186	187	188L	188R	189	190T	190L	190R	191	192L	192R	193	194L
194R	195	196	197	198	199	200L	200T	200B	201	202	203	204L	204R	205	206	207	209	210	216	2nd cover	
3rd cover	4th cover																				

B26	B27	B28	B29	B30	B31	B32	B32a	B33	B34	B35	B36	B37	B38	B39	B41	B42	B43	B44	
B45	B46	B47	B48	B49	B50	B51	B52L	B52R	B53	B54T	B54B	B55	B56	B57	E58	B59	B60	B61L	
B61R	B62	B63	B64	B65	B66	B67	B68	B69	B70T	B70L	B70R	B71	B72	B73	B74L	B74R	B75	B76	
B77	B102	B103	B104	B105	B106	B107	B108	B109	B110	B111L	B111R	B112L	B112R	B112a	B112b	B113	B114	B115	
B116T	B116B	B117	B118	B119	B120	B121	B122	B123	B124	B125	B126	B127	B128	B128a	B128b	B129	B130	B131	
B132	B133	B134T	B134B	B135	B136	B137	B138	B139	B140	B141	B142L	B142R	B143	B144	B145	B146	B147	B148	
B149	B150	B151	B152	B153	B154L	B154T	B154B	B155	B156	B157	B158	B159	B160	B161	B162L	B162T	B162B	B163	
B164	B165	B166	B167	B168	B169	B170	B171	B172L	B172T	B172B	B173	B174	B175	B176	B177	B178	B179	B180L	
B180T	B180B	B181	B182	B183	B184L	B184R	B185	B186L	B186R	B187	B188L	B188R	B189	B190L	B190T	B191	B193	B194L	
B194R	B195	B196L	B197	B224	B225	B226	B227	B228	B229	B230	B231	B232	B233	B234	B235	B236	B237	B238	
B239	B240	B240a	B241	B242	B243	B244	B245	B246	B247	B248	B249	B250	B251	B252	B253	B254	B255	B256	
B256a	B257	B258	B259	B260	B261	B262	B263	B264	B265	B266	B267	B268	B269	B270	B271	B272	B273	B274	
B275T	B275B	B276T	B276B	B277	B302	B303	B304	B305	B306	B307	B308	B309	B310	B311	B312	B313	B314	B315	
B316	B317	B318	B319	B320	B321	B322L	B322R	B323	B324	B325	B326	B327	B328	B329	B330	B331	B332	B333	
B334	B335	B336	B337	B338	B339	B340	B341	B342	B343	B344	B345	B346	B347	B348	B349	B350	B351	B352	
B353	B354	B355	B356	B357	B358	B359	B360	B361	B362	B363	B364	B365	B366	B367	B368	B369	B370	B371	
B372	B373	B374	B375	B376	B377	B378	B379	B380	B381	B382	B383	B384L	B384R	B385	B386	B387	B388	B389	
B390	B391	B392	B393	B394L	B394R	B395	B396	B397	B398L	B398T	B398B	B399	B400L	B400T	B400B	B401L	B401R	B402T	
B402B	B403	B404L	B404R	B405	B408	2nd cover	3rd cover	4th cover											

TAKE ANOTHER LOOK...

. . . at the advertising in this FACTORY issue

. . . at FACTORY's Catalog Service Section

. . . and then check off on this handy postcard the items you want to know more about.

It's an easy way to get all the information you need on any subject you are interested in—you can build your own data file. And you can do it without cost.

Every month in FACTORY you can use the free Catalog Service Section to get useful literature. And every month in FACTORY's advertising pages, leading manufacturers show you new ways, better ways to cut costs, boost production.

NAME .....

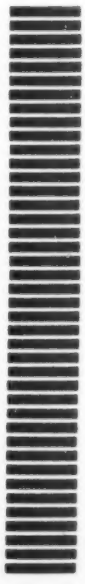
POSITION .....

COMPANY .....

ADDRESS .....

CITY & STATE .....

FIRST CLASS
PERMIT No. 64
(Sec. 34.9, P. L. & R.)
NEW YORK, N. Y.



BUSINESS REPLY CARD

No Postage Stamp Necessary If Mailed In The United States

4¢ — POSTAGE WILL BE PAID BY —

McGRAW-HILL PUBLISHING CO., Inc.
Reader Service Department

FACTORY Management & Maintenance

330 WEST 42nd STREET

NEW YORK 36, N. Y.

PAYLOADER

Changes losses to profits

at Ideal Cement Stone Co.

VALUABLE HANDBOOK

Tells how and where to look for signs of inefficient bulk materials handling . . . how to analyze, organize and set up an efficient handling system. Plus many useful tables and data. Write for "Bulk Materials Handbook" — it's free.

The making of sills and lintels was an unprofitable but necessary evil with this concrete block manufacturer until a "PAYLOADER" arrived on the job to take over the material handling part of the operation. Now, profits have replaced losses. The "PAYLOADER" picks up 1,000 lbs. of sand at a time from a stockpile, carries it 65 feet through narrow aisles and unloads it directly into the mixing machine. A second mixer has been added and the "PAYLOADER" operator runs both. Although fewer men are required, production is much greater and the manufacture of lintels, instead of being carried on at a loss, has become a profitable part of the business.

This is one of thousands of cases where "PAYLOADERS" have made tremendous economies in time, manhours and production costs, both inside and outside of plants — unloading box cars, digging, stockpiling, carrying, loading and spreading bulk materials. "PAYLOADERS" are available in a complete line of sizes and models up to 1½ cu. yd. capacity — a size for every plant and purpose. They are sold *and serviced* by 200 Hough Distributors nationwide. The Frank G. Hough Co., 755 Sunnyside Ave., Libertyville, Illinois.

SAY "HUFF"

PAYLOADER

THE FRANK G. HOUGH CO. SINCE 1928

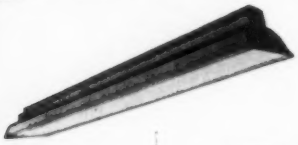
lighting problems SOLVED

for every plant location with a specific Benjamin Unit

☑ THIS CHECK CHART OF BENJAMIN LIGHTING UNITS

shows how lighting can be matched to every seeing task in the plant!

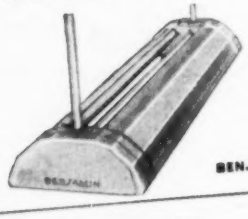
☐ **1.** fluorescent lighting of **GENERAL PLANT AREAS**



Over 300 combinations for matched-to-the-task lighting. Just three channel sizes and four types of reflectors form the backbone of an almost unlimited number of lighting systems for general industrial seeing tasks. Features utilization of high-light-output T12 Slimline lamps and exclusive "Springlox" Lampholders for lower maintenance cost through quicker lamp servicing.

BENJAMIN "Magna-Flo" Systems *described in Manual #1*

☐ **2.** fluorescent lighting to overcome **EXCESSIVE BRIGHTNESS RATIOS**



A new high in seeing comfort for industry! "Task-Master" combines greater upward flow of light with a new high of 35° lamp shielding. Revolutionary new, easier methods of installation and maintenance keep operating and maintenance costs at an all-time low.

BENJAMIN "Task-Master" *described in Manual #2*

☐ **3.** lighting of **HIGH BAYS**

A rugged lighting unit for steel mills, foundries, sheet metal works, and other locations where the lighting units must be guarded against damage from rough handling, flying metal particles, severe mechanical strain or unfavorable atmospheric conditions.

BENJAMIN "Steelite" *described in Manual #3*

☐ **4.** incandescent lighting of **GENERAL PLANT AREAS**

This unit inexpensively matches a variety of general seeing tasks; also for stairways, materials handling areas, etc. Exclusive "Turnlox" detachable reflector cuts time required for cleaning and relamping.

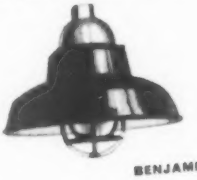
BENJAMIN "Turnlox" Dome Reflector *described in Manual #4*

☐ **5.** lighting for **BINS and SHELVES**

A reflector of unique design, combining uniformity of illumination with careful shielding. Uniformly lights top-to-bottom of shelves, bin tiers in stock rooms, tool cribs and book stacks. Especially adapted for the low mounting heights and narrow aisles of such locations.

BENJAMIN "Stock-Bin-Lite" Reflector *described in Manual #5*

☐ **6.** safe lighting for **HAZARDOUS LOCATIONS**



For locations listed by U.L. as Class 1 Groups C and D. Recommended for areas where explosive atmospheres or inflammable dust is found. Available in a choice of four reflectors and a variety of mountings. Especially constructed to withstand the tremendous pressure of internal lamp explosion.

BENJAMIN "Explosion-Proof" Units *described in Manual #6*

☐ **7.** approved lighting for **HUMID LOCATIONS**

Listed "Vapor-Tight" by U.L. Suitable for use in locations exposed to moisture or non-combustible dust, corrosive fumes, vapors, dust and smoke. Rugged construction, unbroken surface of Porcelain Enamel and heavy-gauge steel assure long life without breakdown or frequent servicing.

BENJAMIN "Vapor-Tight" Units *described in Manual #7*

☐ **8.** proper floodlighting for **OUTDOOR INDUSTRIAL AREAS**

The ideal all-weather unit for industrial recreational areas, ball fields, pools, etc. Highest quality outdoor illumination due to combination of large diffusing Porcelain-Enameled Steel Reflector with inner aluminum reflector.

BENJAMIN "Play Area" Floodlight *described in Manual #8*

☑ GET THESE FREE LIGHTING MANUALS!

- ☐ 1. General Plant Lighting (fluorescent)
- ☐ 2. Controlled Brightness for greater seeing comfort
- ☐ 3. High Bay Lighting
- ☐ 4. General Plant Lighting (incandescent)
- ☐ 5. Stock-Bin Lighting
- ☐ 6. Hazardous Locations
- ☐ 7. Humid Locations
- ☐ 8. Industrial Floodlighting

BENJAMIN ELECTRIC MFG. CO., Dept. N
DES PLAINES, ILLINOIS

Without cost or obligation, please send me Benjamin Manuals covering the subjects I have checked off at left.

NAME AND TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

BENJAMIN

B-215